FIRST SERIES NO. 191 NOVEMBER 15, 1930

UNIVERSITY OF IOWA STUDIES

STUDIES IN CHARACTER

VOLUME III NUMBER 4

THE DEVELOPMENT OF IMAGINATION IN THE PRESCHOOL CHILD

by

ELIZABETH GORDON ANDREWS, Ph.D.

PUBLISHED BY THE UNIVERSITY, IOWA CITY, IOWA

Issued semi-monthly throughout the year. Entered at the post office at Iowa City, Iowa, as second class matter under the Act of October 3, 1917.

UNIVERSITY OF IOWA STUDIES IN CHARACTER

EDWIN D. STARBUCK, Editor

From the Institute of Character Research

BRIGHAM YOUNG UNIVERSITY
LIBRARY
PROVO, UTAH

VOLUME III NUMBER 4

THE DEVELOPMENT OF IMAGINATION IN THE PRESCHOOL CHILD

by

ELIZABETH GORDON ANDREWS, Ph.D.

PUBLISHED BY THE UNIVERSITY, IOWA CITY

November, 1930

ACKNOWLEDGMENTS

The writer wishes to express her appreciation to the members of the staffs of the Institute of Character Research and the Child Welfare Research Station, who, in many ways, have contributed to the accomplishment of this study.

Particular acknowledgment is due to Dr. George D. Stoddard, Director of the Child Welfare Research Station, for his generous cooperation and friendly counsel, and to Dr. Edwin D. Starbuck, director of this research, whose keen penetration, kindly criticism, and timely encouragement have been a constant source of inspiration.

CONTENTS

CHAPTER PAGE

I. Introduction 5

II. Methods 12

III. Tests A and B 24

IV. Test C 28

V. Observational Method 47

VI. Summary and Conclusions 57

Bibliography 61

TABLES

TABLE PAGE
1. Types of Response at Seven Age Levels, Test A-B 25
2. Types of Response at Seven Age Levels, Test C 29
3. Average Quality Scores—Boys and Girls 32
4. Correlations with Teachers' Judgments 35
5. Constructive and Non-Constructive Responses 38
6. Responses in Terms of Whole or Part 42
.7 Test C Repeated 46
8. Observational Checking—Seven Observers 51
9. Correlations from Table 11 51
10. Observational Checking—Eight Observers 52
11. Correlations from Table 13 53

ILLUSTRATIONS

PAGE
Tachistoscope in Operation 13, 14
Pictures Used as Stimuli—Test C 15
The Test Situation 22, 23

FIGURES

FIGURE PAGE
1. Distribution of I.Q.'s 21
2. Types of Response—Test A-B 26
3. Types of Response—Test C 30
4. Frequency Scores—Test C 31
5. Sex Differences 33
6. Whole and Part Responses 43
7-11. Test C Repeated 45
12-13. Individual Profiles 54, 55

CHAPTER I

INTRODUCTION

The purpose of this investigation is to trace the development of imagination in the preschool child and to ascertain its relation to intelligence, chronological age, sex, and individual differences. To this end three tests have been devised to be presented tachistoscopically, and a checking sheet has been developed for the more accurate observation of imaginational free play activities of preschool children.

We have chosen to define imagination as the process by which items of experience are combined to form new products.

Imagination, one of the outstanding mental activities of these earlier years in the life of the child, has been somewhat neglected by experimenters in the field of child psychology. Some excellent observational studies have been made by those interested in the total development of the child and these have not been without scientific value. Experimental work on imagination has been very slight and has been confined chiefly to the study of small numbers of adults and carried out under inadequately controlled conditions. For the most part ink blots have been the stimuli used. The ink blot as a stimulus was standardized by Whipple.[1] Those who have followed have used ink blots "standardized or otherwise."[2]

PRIOR EXPERIMENTS

The use of the ink blot as a device for the investigation of imagination was first suggested by Binet and Henri in 1895.[3]

In 1897 Dearborn, in an article, described the making of ink blots,[4] and followed this a year later by an experiment in which he used one hundred and twenty ink blots. His subjects were sixteen students and professors of Harvard University.[5] His results indicate that "the experience of the subject has an important influence on the response. . . . A domestic woman is reminded of domestic objects while an artist sees picturesque and fanciful things."

---

[1] Whipple, Guy Montrose, *Manual of Mental and Physical Tests,* Part II, p. 254 (620). Warwick & York, Inc., Baltimore, 1915.

[2] Parsons, Cicely J., "Children's Interpretations of Ink Blots", *British Journal of Psychology,* Vol. 9, pp. 74-92, 1919.

[3] Binet & Henri, "La Psychologie Individuelle", *Annee psychologique,* V. II, 1895.

[4] Dearborn, G. V., "Blots of Ink in Experimental Psychology", *Psychological Review,* V. IV, 1897, p. 390.

[5] Dearborn, G. V., "A Study of Imagination", *American Journal of Psychology,* V. IX, 1898, p. 183.

Stella Emily Sharp reports a test made with seven adults.[6] She finds that "qualitative results are more important than quantitative." The quantitative results are based on the number of responses given in the five minutes allowed for the test (10 blots). She also reports that the kind of response depends on the source of associations. The subjects are divided into two groups, (1) those who are more matter of fact, who simply name the fact, and (2) those who put details together to form a significant whole. With this as the basis the responses are classified as follows: (1) Associations few and non-constructive. (2) Associations many and varied but non-constructive. (3) Associations numerous and constructive. She finds that the non-constructive responses are much in the majority.

In a search for a test of ability, E. A. Kirkpatrick[7] used as his fifth test four ink spots. His subjects were five hundred children from the first to the eighth grades. He found that "the younger children are more imaginative, that the children in the fourth, fifth, and sixth grades are less imaginative but that there is an increase again in the seventh and eighth grades. These older children use the term 'like'."

Cicely J. Parsons had for subjects ninety-seven children aged seven and seven and a half years.[8] In this study the Whipple standardized ink blots 1-10 series were used. The responses were classified and the findings indicated a marked preponderance of non-constructive associations, no significant sex differences, and that children are most interested in animals and other living things.

H. L. Hargreaves[9] has used a series of six tests in his study of imagination: (1) indeterminate picture completion, (2) unfinished pictures, (3) ink blots, (4) indeterminate language completion, (5) unfinished stories, and (6) writing words. The responses are scored on a fluency and frequency basis. Hargreaves uses the term fluency to signify quantity or the number of items given in response to one stimulus. Frequency is used to indicate originality of response or quality and is measured by the number of responses which are peculiar to the individual subject and not used in that situation by any other subject. The results are treated statistically by the tetrad equation of Spearman.[10] Conclusions in brief are: "Fluency of imagination equals 'g' plus speed, plus memory, plus X; tests of imagination have some common group factor but very little relationship to 'g'; on analysis of the factors no sign of a general unitary and unique imaginative power or faculty was found. It is tempting to regard the factor common to originality and fluency as factor X, but it need not necessarily be so."

---

[6] Sharp, Stella Emily, "Individual Psychology", *American Journal of Psychology,* V. X., 1899, pp. 371-373.

[7] Kirkpatrick, E. A., "Individual Tests of School Children", *Psychological Review,* V. VII, 1900, p. 274.

[8] Parsons, Cicely J., "Children's Interpretations of Ink Blots", *British Journal of Psychology,* 1917-18, pp. 74-92.

[9] Hargreaves, H. L., "The 'Faculty' of Imagination", *British Journal of Psychology,* Monograph Supplement, V. III, 1929.

In these studies the varied methods of presenting the stimuli, the time given for responses, the methods of classification, and the wide distribution of subjects as to age and education make any comparison of results well nigh impossible.

This brief survey of the literature is sufficient to indicate that it contains very little on the *development* of the imagination. A single exception may be found in the study by Kirkpatrick. This, however, is concerned with older children and the data given are so fragmentary that few conclusions can be drawn.

A more recent, but as yet unpublished, investigation has been made by Martha Beckman Ransohoff.[11] Two kinds of stimuli were used, the Whipple standardized ink blots 1-20 and a picture test. "For the latter test pictures were taken from current magazines." These pictures were "typical of modern advertising art, which is more or less meaningless to children but which is significant to adults." Four judges "trained in psychology" took the list of words used by the children and scored them as follows:

0.00 if entirely erroneous
.50 if slightly resembling or suggesting the object
1.00 if fairly accurate
1.50 if almost perfect
2.00 for a perfect answer

In scoring the responses to ink blots those subjects received the highest score who five times out of five gave the same ink blot the same name.

Her conclusions in brief are, that imagination of young children improves with increasing maturity; there are slight sex differences; young children are as much interested in piling cards as they are in looking at the cards; there are more variations between the members within groups than between the groups themselves.

---

[10] Spearman, C., *The Abilities of Man,* Macmillan and Co., London, 1927.

[11] Ransohoff, Martha Beckman, "Imagination in Young Children", Unpublished Master's Thesis, University of Cincinnati, Ohio, 1928.

These conclusions in regard to sex differences were based on the study of the responses of six boys and six girls. The total number of children to whom both tests were given was twenty-two.

Correlations found in the study are as follows:

Ink blot scores and C. A.	.71 ± .077
Ink blot scores and I. Q.	.36 ± .13
C. A. and number of words used	.88 ± .029
I. Q. and number of words used	.45 ± .11
Picture scores and C. A.	.47 ± .11
Picture scores and I. Q.	.37 ± .13
C. A. and words used	.85 ± .042
I. Q. and words used	.55 ± .096

THE PROBLEM

The problem is two-fold: first, to develop a method for the measurement of imagination which may be carried out under controlled laboratory conditions and with stimuli more meaningful than ink blots; and second, by this method, to study the development of imagination as indicated by differences in types of response at various age levels, as well as by originality of response as measured by frequency. Different types of imagination have also been investigated by the observational method, for which the development of a checking sheet has been undertaken, by use of which the observations of several observers might, if possible, have greater reliability.

Points of scientific interest that have been kept in view for investigation are as follows:

1. The reactions of the child to a closely controlled situation, particularly with reference to the tachistoscopic test used in this investigation.
2. The value of simple black line drawings as stimuli for imaginative responses.
3. The course of development as to fluency of imagination, as measured by the number of associations made to a single stimulus at various ages, and its relationship to the fantastic stories of the young child.
4. Frequency of response as indicative of originality of imagination.
5. Types of imaginative response and their relation to chronological age, mental age, sex, and individual differences.

6. The proportion of constructive and non-constructive responses at different ages.
7. The responses as expressed in terms of whole or part.
8. The value of teachers' judgments in measuring the imagination of the preschool child.
9. The development of imagination in a group of children measured ten months later by the same tests, as compared with the development as indicated by the variation in types shown by groups of children at succeeding age levels.
10. Individual differences.

Need for a New Method

The use of the ink blot as a stimulus has many of the faults applicable to the use of the nonsense syllable in learning. Like nonsense syllables the ink blot is "lacking in meaning and so association and organization are more difficult to attain."[12]

Experimenters with young children frequently report much perseveration in response to the ink blot. Any printed picture of a tree, for example, is but an ink blot of varying size or shape and therefore every successive ink blot may appear as merely another tree of a different shape. There is a factor of similarity of composition in all ink blots which may operate to bring repetition of the same response. The repetition under such circumstances may indicate a low degree of imagination but is not necessarily perseveration. To illustrate, a picture of a house is shown and the child says "house"; next a picture of a bird is shown and the child says "house." This is clearly a case of perseveration. But if a picture of a soldier is shown, followed by a picture of an Indian, and the response "man" is given to each, we could in most cases scarcely call this perseveration, and yet the two may be no more nearly alike than are two ink blots.

In the previous studies in imagination, the incompleteness of the data given and lack of standardization of the blots and pictures used, make it impossible to repeat these experiments.

The scoring method used by Miss Ransohoff, whereby a score of zero is given for an "entirely erroneous" response and two (the highest score) for a perfect answer in the picture test, while in the ink blot test the highest score goes to those who five times out of five give the same ink blot the same name, seems to classify the highest type of imagination that which calls a spade a spade, rather than that which produces something new. This would seem to make this a test of learning rather than of imagination as we have defined it. If it is true that this test does measure learning rather than imagination, then the results which indicate that it "increases with age" would agree with other experiments on learning.

---

[12] Koehler, Wolfgang, *Gestalt Psychology*, Horace Liveright, New York, 1929, p. 288.

The result of the lack of controlled experimental conditions is well illustrated in the conclusion that "children are as much interested in piling cards as they are in looking at the cards."

In the present study the attempt has been made to find some stimulus other than the ink blot which would bring forth responses in which imagination might be measured. Our criterion for imagination is its conformation to our definition of imagination as the process by which items of experience are combined to form new products. We have also sought to present the stimuli under conditions closely controlled as to time of exposure, distance from the subject, illumination, and as nearly as possible, absence of distractions.

Preliminary Experiment

In order to determine whether the tachistoscope might be used with children of these ages (2-6), a preliminary test was conducted. A small exposure apparatus, made in the department, was used. This consisted of a box with outside dimensions of 16½x15½x4 and having a small window opening 3x3 in the lower center front. A revolving disc on a central axis behind the front of the box was operated by hand. On the disc there was room for six pictures. In order to expose the twenty-four items used in the preliminary test, it was necessary to change the disc four times during the experiment. This change proved a great distraction to the subjects. The box was not large enough to conceal the operator and the child became interested in the operation of changing the disc. This was disrupting to the test situation. With the hand operated disc it was also impossible to give the time exposure with any degree of accuracy. However, the method of presentation approximated the situation which would prevail if a tachistoscope were used, and results indicated that such an apparatus might be used successfully with young children.

The nature of the stimuli to be used was our next problem. The first set of cards was made up of pictures of familiar objects or parts of objects, cut from magazines or drawn on white cards. Since only four subjects were used, no statistical study was undertaken, but a study was made of the type of responses made to the various items, and a test built up which included items of varying degrees of completeness. In another preliminary test, plane geometric figures as experienced in blocks and combinations of lines and dots were used. These also were found to be productive of imaginative response. With the four subjects used in this test, children who were in the middle group as to age and with average I.Q. of 114, the imaginative responses to the geometric figures were four out of a possible four. As the figures became more schematic at one end of the scale or more nearly approached representation at the other, the imaginative responses were fewer in each direction.

The results of this preliminary test indicated that the preschool child could be tested in a controlled situation and that a series of stimuli ranging in difficulty from a complete reproduction of a familiar object to a very schematic representation by dots and lines, might give range sufficient to measure the imagination of children of these ages.

CHAPTER II

METHODS

Apparatus

The exposure apparatus used in the following experiment was the Whipple Rotary Tachistoscope. This model was chosen, since, because of its size and simplicity, it seemed to lend itself better to adaptation for use with young children. For the purpose of the experiment it was not deemed essential to have the time element reduced to its lower limits, but it was thought necessary to keep the time of exposure constant. To this end the time of exposure arbitrarily chosen was one second. The instrument was set in accordance with the instructions given by Whipple.[1]

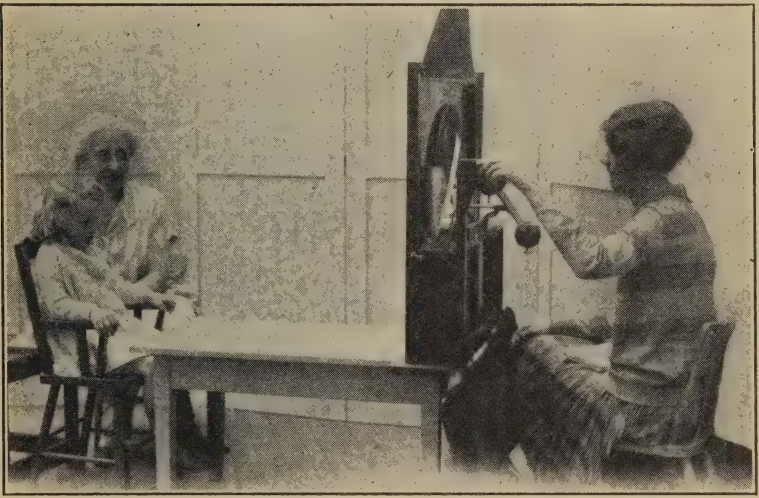
The lower limit of time required for one full view is given by Whipple, quoting from Dodge, as one hundred sigma, so that by allowing ten times that amount there would seem to be sufficient leeway to take care of individual differences. Results would indicate that the time thus chosen was sufficiently long, as none of the subjects had any difficulty in recognizing familiar wholes with this time of exposure. The purpose in placing any limit on the time was to make the situation the same for all subjects, and to allow the imagination to take full control once the stimulus had been given, and not to hamper it by the continued presence of the percept.

The tachistoscope was made to resemble a play-house by the addition of a triangular piece of black compo board to the top, representing the roof. At the same time this served to conceal the movement of the rod and weight. A white disc was used in place of the black one provided, in order to attract attention to "the window with the white shade." The light used was a frosted tubular lamp, sixteen candle power, in diffuse daylight adaptation which provided constant illumination.

The tachistoscope was placed on the end of a preschool table suited to the size of the children in the various groups. By means of a curtain attached to the lower edge of the apparatus, and a screen on each side, the operator was entirely hidden from the child's view. At the other end of the table the child was seated in a chair with arms which fitted just below the table top, thus keeping the child directly facing the window and at a uniform distance from it, with eyes on a level with the window opening. The arms of the chair provided some restriction as to the amount of turning of the body, but this was not sufficient to make the child feel unduly restrained. The experimenter sat on the left of the child with her recording materials directly behind the subject's back, in order that the child's attention might not be distracted by the writing.

---

[1] Whipple, G. M., *Manual of Mental and Physical Tests,* Warwick & York, Baltimore, 1910, p. 245.



"Watch the Window"

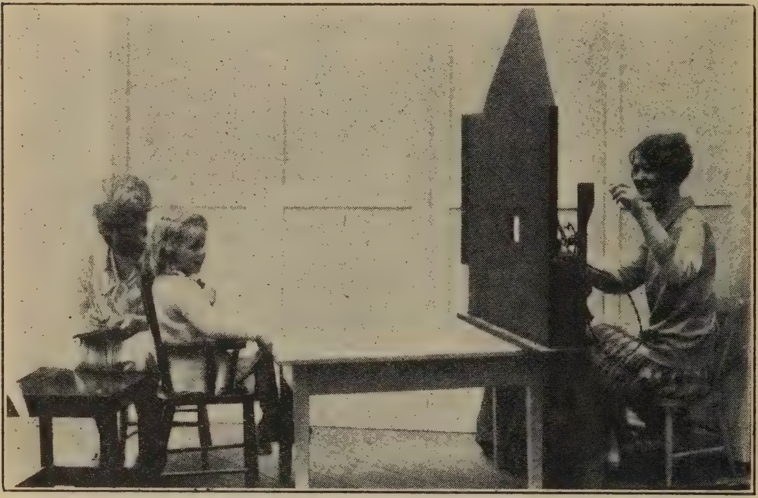
MATERIAL

The simulus cards used were the 5x8 white cards which fit the larger of the two holders with which the apparatus is equipped. In selecting the items for the pictures an attempt was made to include figures and forms, or their parts, of objects familiar to all the children; that is, from playthings, objects, persons, or animals which all had experienced. This was assured by including only those toys and objects which are used in the preschool equipment.

The pictures used in Test A included seven sets of four items each as follows: (1) pictures of complete objects, *e.g.*, a bird; (2) parts of objects, *e.g.*, a head; (3) smaller elements, *e.g.*, a nose; (4) plane geometric figures, *e. g.*, a circle; (5) parts of geometric figures, *e. g.*, a semi-circle; (6) combinations of lines; (7) combinations of dots.

Test B was made up of the same groups as Test A, but the individual pictures were in every instance different from those in Test A.

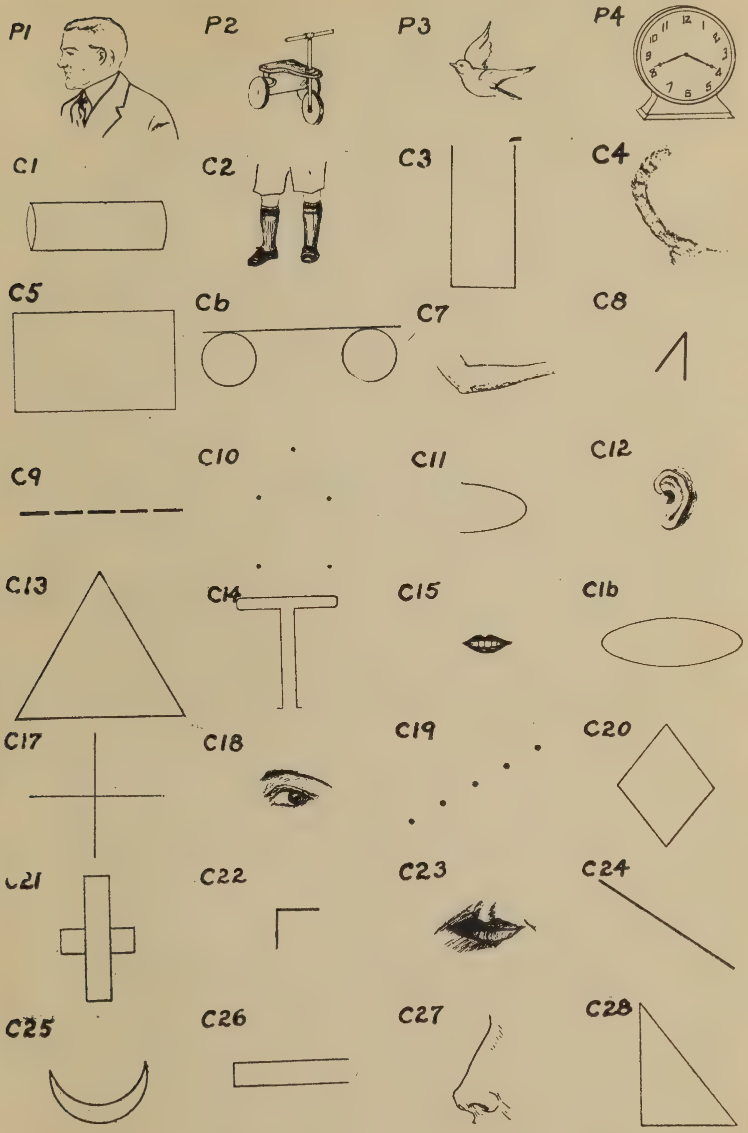
The pictures used in Test C are reproduced on page 15. As shown they are one-half the size of the original stimuli. These drawings were made in India ink on white cards by a student in Psychology of Art at the State University of Iowa. These twenty-eight pictures, excluding the four preliminary cards, were selected statistically from the fifty-six originally used in Tests A and B, on the basis of frequency of imaginative response; that is, those items were retained which showed the greater number of new responses. Where two items showed great similarity of response, the one giving the lower frequency score was eliminated.



"What Did You See?"

The value of this method of selection is shown by the fact that the reliability of alternate items in the combined results of Tests A and B of fifty-six items, given to seventy-two subjects was .86 ± .02. Between Test A and Test B the correlation was .87 ± .02, while the correlation between alternate items of Test C of twenty-eight items was .82 ± .02, thus maintaining nearly as great reliability with a test of half the length.

Complete objects, such as the four given as preliminary pictures, which were originally included in Test A and Test B, were eliminated from Test C because they invariably brought simple reproduction. They were, however, left as preliminary pictures since they gave the



Pictures Used as Stimuli in Test C.

experimenter a check as to the amount of training required in watching the window, and in determining before the main test began whether the time of exposure and illumination were adequate.

In all three tests the cards were shuffled and presented in a hit and miss order, which was retained for all subjects.

Sample Responses from Test C (page 15)

1. A can, had some peaches in it; a rolling pin; a roll of paper; a glass; a cannon; a mark all round my package; sort of a pipe.
2. Boy, all broke, too bad; stockings; lady; candles; two legs; little boy's legs; boys legs and trousers.
3. A cage; a clock; pinchers; bridge; a square mark; a magnet; part of a block; a long square, had to have one more side to be a square;
4. That was a fishie, the fishie swims; a carrot; an elephant's trunk; a snake; a wrist watch; a Hoover, you know, it makes a noise hoo-oo-o and gets dust from the floor; a squirrels tail; a cat's tail.
5. Light; a big, big board; a race track, run the races on; making a house; window; a square; something like a square.
6. Some glasses; wheels; a big board eating itself up; a little flat car; a wagon; some balloons; two round things with a cross.
7. Fix the auto; a foot; the stick was all bent; a big stick; like L, part of my name; arm; like funny roads.
8. A camel; some twangs, it makes music; a squeezie; one bird with its wing down; a chicken mouth; two lines joined together; half of an A.
9. A three of spades; a windmill, makes horses drink; choo choo train; a ruler and it makes lines; little stitches; that was marks, marks, marks; little lines.
10. Some black buttons; some snow balls; holes; bees; little dots for a house; little balls painted black; dots.
11. A circle; a basin; a little circle that was broken, the doggie broke it, just pulled it and it was broken; a little bit of finger; a horseshoe; finger nail; half an egg.
12. A nest, lays egg for little bird; a squirrel; rose, clock; some hay; a head of an Indian; curly hair on nothing.
13. A big part of the easel; a boat; a kite; the roof of a house; a letter; a triangle; a sand mountain.
14. A tree; a sword; big arms holding out; a clothesline; a telephone pole; T; a croquet stick; lawn mower handle.
15. Lady bug; a whistle; a little bow and arrow; a boat; a dish; a pumpkin's teeth; teeth.
16. A man's hat just like my daddy has; a bean; a banana, I take a piece of the skin off and bite it and it goes away down to my stomach, away down to my toes; an Easter egg; a boat; a wheel; like a wing.
17. A lamb, it was a little lamb; a name for my green doll; a windmill, a propeller; a street over like that and a street down like that; Jack tar; cross; looked like a windmill.
18. A feather; bird that was broken, it's going to get fixed; a giant; a cap; man's eye, maybe a devil burned him all up; eye; man's eye.

19. Rain; a sprinkling can; dots fixed right on the sweater, over my shoulder and over my skirt. I have beads on my skirt too; balls, wee, wee balls; spots; the sidewalk; dots for a crooked line.
20. A window; a block; a big stick and it hit the dog; a spade; pretty near like a square; diamond; diamond shape.
21. A God bless us; little pump; a big cross letter; a doll; a red cross; a short stick, a long stick; like a windmill.
22. That's a junkel; tree that was broken; jacks; a gun; a number; part of a square; a corner.
23. That's a man; a pinching bug; a fish going under the bridge the automobile go over; I saw a plane, did it have a smash up? I believe it did, because the pipe was sticking out. The man came down in a parachute; a hit in the motor; a boat; some kind of a bug.
24. Grass; a stick; a crack; one; only a one mark step; a crooked mark; a line, not crooked but down like that.
25. A doggie bit me; a little bird sat in a cradle; a worm; moon; moon, night; half of a moon; half of the moon.
26. Wheelbarrow; up and down; pinchers; what we play croquet through; a garage; part of a handle of a wagon; a handle of a hatchet.
27. A dead big bird; an eagle; a pig's tail; that's what we chop grass off with; a nose of a pig; some of a man's face; nose.
28. Jungle gym; a slide; a tent; a ship; soldier's hat; half a square; just starting to be a square; a square.

Scoring Method

Two methods of scoring responses in the tests were used, the Frequency Score and the Quality Score.

1. *Frequency Score.*

The frequency score was based on the number of times the same response was given to one item. Those responses which occurred most frequently were scored least, and those which occurred but once were given the highest score. To ascertain the score of a given response a frequency table was made for each item of the test which indicated how often any given response occurred. The less frequently a response occurs the greater the originality of that response, since the subject has seen an element of similarity which has escaped the notice of others. The arbitrary distribution of scores used was as follows:

No. of times response occurs	Score
1	5
2, 3, 4	4
5, 6, 7	3
8, 9, 10	2
More than 10	1

The strength of this method of scoring lies in the absence of subjective judgment on the part of the scorer. Its weakness lies in its failure to make any of the finer qualitative distinctions.

2. *Quality Score.*

The quality score, while allowing some leeway for subjective judgment, does at the same time make it possible to classify the response according to types of imaginative response. The scores given to the various types are entirely arbitrary and the weighting given has no statistical value, since there was no way of determining the comparative degrees of imagination expressed by each type of response.

The quality types were determined by a study of the responses of the children. These responses appeared, in the main, to fall into five general classes. No doubt the border line between classes is somewhat indeterminate, as is true in most classifications, nevertheless there is apparent a separation of groups more or less easily recognizable.

While it has been found impossible to arrange the types in a true hierarchy for each response, there seem to be types which have more or less similarity, and these groups are rated alike. The hierarchy of groups was determined in consultation with members of the department and with judgments as given in the literature. Most of these are subjective judgments based on observation rather than experiment.

The quality score as used in these tests and also for scoring the observational checking sheet is as follows:

Quality Scoring Table

Test A, B, C	Score	Observational Check
No response		
"Don't know"	0	No imaginative play
Reproduction	1	Imitation
Close analogy		Analogy
Whole for part	2	Experimentation
Transformation		Transformation
Animism		Animism
Personification	3	Personification
Sympathy		Sympathy

Dramatization		Dramatization
Explanation		Explanation
Fantastic stories		Fantastic stories
Construction	4	Construction
Extension of language		Extension of language
Appropriate quotations		Appropriate quotations
Aesthetic appreciation		Aesthetic appreciation
		Aesthetic performance
		New uses for toys
		New games
		Leadership with plan

The above types as used in scoring the responses to Tests A, B, and C may be briefly defined as follows: "No response" or "don't know" indicates an absence of imagination.

"Reproduction"—naming the object presented, an act of memory in which there is a simple element of imagination.

"Close analogy" or "whole for part"—in which the presence of several elements or close similarity brings the response.

"Transformation"—changing one object into another, a transfer through partial resemblance.

In "animism" transformation takes the form of giving life to inanimate objects.

In "personification" the object or animal becomes a human being.

In "sympathy" the subject by an act of the imagination puts himself in the other person's place, and

In "dramatization" the subject carries out in words and action some real or imaginary situation.

"Explanation" giving fanciful explanations or "imagined reasons."

"Fantastic stories" or romances—free associations of images.

"Construction"—combining elements to create a whole.

"Extension of language"—the invention of new words or finding new uses for old words.

"Appropriate quotations"—fitting a learned quotation to a specific situation.

"Aesthetic appreciation"—expression of the appreciation of the beautiful in any form.

The frequency score is entirely objective and is determined in such a way as to give the highest score to those responses which are most original, or, in other words, to those responses which show the greatest degree of imagination as defined in this study. It may therefore be used as the criterion by which we measure the validity of the quality score which is based on more subjective judgments.

The objection may be made that while the frequency score would remain constant regardless of the scorer, the quality score, being subjective, would vary with the scorer. In order to determine whether this were a valid objection, the verbal responses of these one hundred and two subjects were submitted to Dr. Emeline Moul, Assistant Professor of Psychology at Florida State College for Women. Dr. Moul had no information about the experiment, and no instructions as to how to proceed to score the results other than the scores as given in the quality scoring table and definition of types in this chapter. She was simply asked to score the responses as she would thus classify them. The result of her classification was compared with that of the experimenter, r being .84 .019.

SUBJECTS

The subjects used in this study were one hundred and two children of the Child Welfare Research Station of the State University of Iowa. These children range in age from two to six years and are divided into four groups as follows: (1) Home Laboratory, (2) Group I, (3) Group II, (4) Junior Primary. In general these groups are arranged according to age from the youngest in Home Laboratory to the five year old group in Junior Primary, but since there is considerable overlapping, these groups have been for the most part disregarded and division made on the basis of chronological age. The principal exception to this rule has been made in the case of comparison with teachers' judgments, where it was necessary to maintain the group division in order to have comparable ratings. According to the division by ages the distribution is as follows:

Age	2-3	3-4	4-5	5-6
Number	12	34	28	28

These children are somewhat selected as to intelligence. The average I.Q. is 114.02 and the range 60 to 154. All but two of the subjects falling between 85 and 154. The intelligence test used for the two year old group was the Kuhlmann Revision of the Binet, while the Stanford Revision was used for all above three years of age. The distribution shows a fairly normal curve with a slightly larger number of "Superior" children which raises the average of the group. Eighty-two per cent of the subjects fall above the average of the population (100) as judged by the norms of the Stanford-Binet tests.

The subjects belong to a socio-economic level somewhat above the average, being children from a prosperous mid-western city having a population of 15,000. Many of the parents are connected with the State University as members of the faculty, graduate students, or employees, but many others in the community are included who desire to take advantage of the preschools for their children. Admission is limited only by the order of application and the capacity of the schools. The fee charged is nominal. The children of the summer session, thirty of whom were used in this study, come from a wider area, their par-

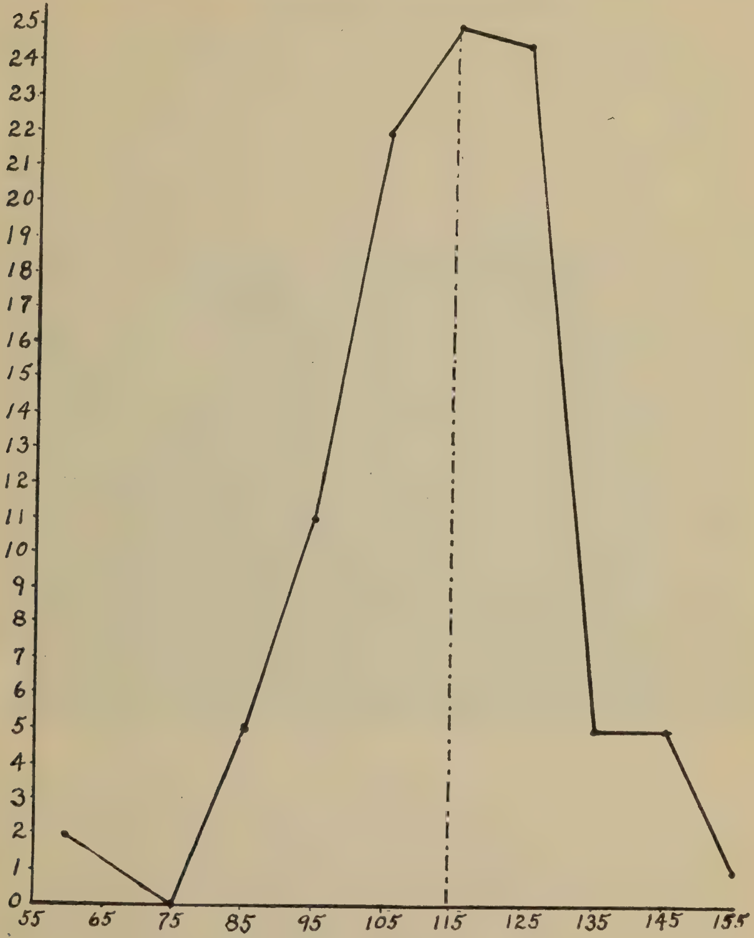
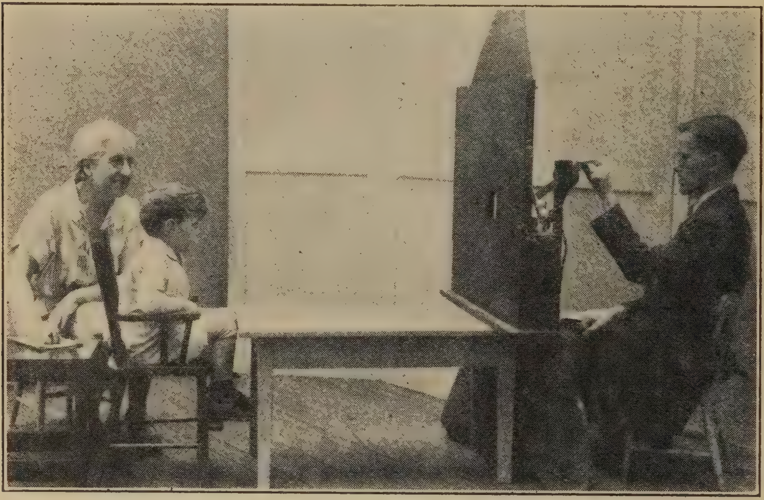


Figure 1. Distribution of Intelligence Quotients
Range 60 — 154 Average I. Q. 114.02

ents frequently coming as members of the summer school faculty, or for graduate work. This gives a somewhat wider sampling as to locality than is found in the children of the winter session.

METHOD OF PROCEDURE

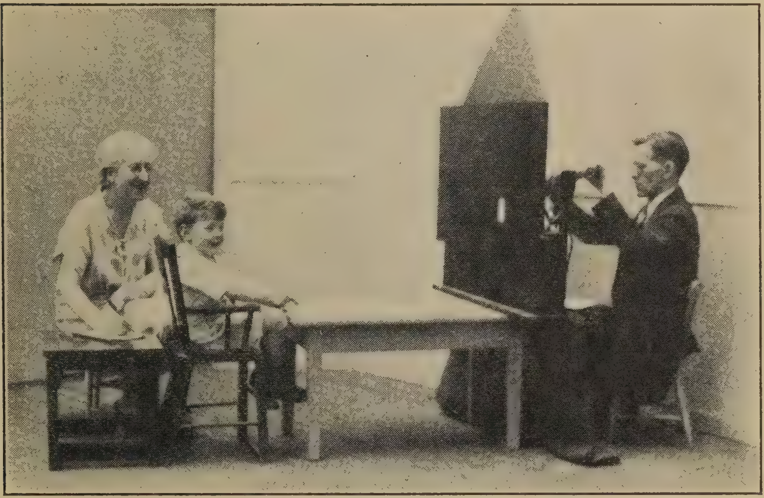
After the establishment of rapport with the subject by the usual approved methods, he is invited to come and play a game with the experimenter. If the latter has been at all skillful in establishing rapport, and is watchful not to interrupt an especially interesting situation, there is a ready response. On entering the experimental room or for the sake of conversation on the way there, the experimenter may begin to tell the child about the little playhouse with its roof, and the window with the white shade. The child is then shown the house and his attention is directed to the window. He is asked to be seated in the chair at the end of the table. The experimenter then explains that when she says "Watch the window" he is to look straight at the window and when the shade goes up he will see something. She then says "Watch the window," and the operator who takes this as his cue, releases the bar which makes the disc revolve and discloses the picture at the window. After a slight pause the experimenter asks, "What did you see?" and records the child's response verbatim. The child



"Now—Watch the Window"

sometimes talks on indefinitely, when it may become necessary to curtail the romance in order to complete the test.

The operator should be sufficiently skillful in the manipulation of the machine so that he can change the cards and operate the rod and weight without noise, and at the same time quickly enough so that there is no appreciable delay when the child is ready for the next picture. It has been found easier to accomplish this by placing four cards in the holder at one time, while having the remainder of the cards arranged in groups of four ready for transference to the holder.



"What Did You See?"

If the experimenter watches the child's eyes from the side at the time of the exposure, she can readily ascertain if he has had his attention focused on the window at the correct time. If he has not, and then says he did not see anything, the experimenter may say, "We will look at that again," which is the signal to the operator for a repetition of the picture.

The test of twenty-eight items takes, on the average, ten or fifteen minutes to administer. It is advisable not to take longer lest the subject become fatigued. This is particularly apt to occur at the lower age levels.

CHAPTER III

TESTS A AND B

MATERIAL

The stimulus cards used in Tests A and B, consisting of twenty-eight items each, were as follows:

- 4 pictures of complete objects
- 4 larger parts of objects
- 4 smaller elements of objects
- 4 plane geometric figures
- 4 parts of geometric figures
- 4 combinations of lines
- 4 combinations of dots

In no case was an item in Test A duplicated in Test B so that the two tests were in fact one test of fifty-six items given in two parts. At the beginning of the experiment, it had been the intention to give these tests at regular intervals of two weeks, but an epidemic of colds among the children disrupted the attendance at the preschools in such a way as to preclude strict adherence to this plan. The schedule was followed as closely as possible, however, with the result that the average interval between tests was sixteen days.

SUBJECTS

Tests A and B were given to seventy-two children in the four preschools divided according to age levels as follows:

Age	2-3	3-3:6	3:6-4	4-4:6	4:6-5	5-5:6	5:6-6
Number	8	8	12	10	7	15	12

SCORING METHOD

Tests A and B were scored by the quality score as described in the chapter on scoring methods (p. 17) according to which the individual responses are classified as belonging to one of five types: (0) lacking imagination, (1) reproduction, (2) analogy, or part for whole, (3) transformation, (4) other types. These five types are defined on page 18. The average number of responses of each type at each age level is given in Table 1. The correlation between Test A and Test B is

.97 ± .004. The combined scores by types are shown graphically in Figure 2, page 27.

TABLE 1

Average Number of Responses of Each Type at Seven Age Levels.

Tests A and B.

Age	(0)		(1)		(2)		(3)		(4)	
	A	B	A	B	A	B	A	B	A	B
2:0-3:0	7.6	6.4	5.1	5.4	1.7	2.2	12.2	13.1	1.	.5
3:0-3:6	3.9	5.0	5.9	5.5	2.2	3.5	19.4	14.0	.6	.0
3:6-4:0	2.6	2.7	8.4	8.4	2.9	3.5	12.0	11.4	2.0	1.9
4:0-4:6	3.0	3.4	10.0	9.2	2.1	3.9	11.9	9.8	1.	1.6
4:6-5:0	.7	1.5	12.5	11.3	5.8	5.1	7.4	9.4	1.4	.6
5:0-5:6	.4	1.	14.8	15.0	5.4	5.4	6.8	6.1	.5	.5
5:6-6:0	1.0	.9	17.2	15.9	4.0	4.0	5.3	5.6	.4	.2

A study of this table and graph shows that the "no response or don't know" type decreases steadily from two years to three years nine months, but shows a slight increase for the succeeding half year, after which it again makes a sharp decline and then remains on about the same level throughout the year in Junior Primary.

Reproduction increases somewhat slowly up to 3-3 and then with much greater speed but very constantly from then until the age of six. Transformation on the other hand, increases quite rapidly up to the age of 3-3 and from then on declines at practically the same rate as that at which reproduction rises.

Analogy follows much the same course as reproduction in its increase up to five years, when it not only loses its momentum but actually shows a loss. This is coincident with the time when the child enters the Junior Primary.

The more infrequent types of imagination, as shown in these tests (personification, sympathy, dramatization, fanciful explanation, fantastic stories, construction, extension of language, appropriate quotations, and aesthetic imagination), as indicated by (4) in the chart, show their height at 3-6 to 4-0 years. It should be stated, however, that the larger number of these cases are furnished by a few individuals who are chiefly among those who have high imaginative scores both as judged on a quality and a frequency basis. The low amount of these types of imagination in the Junior Primary year is again to be observed.

MENTAL AGE AND IMAGINATION

These subjects had been given the Stanford revision of the Binet Tests within a period of six months. Their mental ages as measured by this test were correlated with the quality scores of Test A by the Pearson Product Moment formula r equals —.203 ± .047. The correlation between mental age and Test B quality score gives r equals —.200 ± .048.

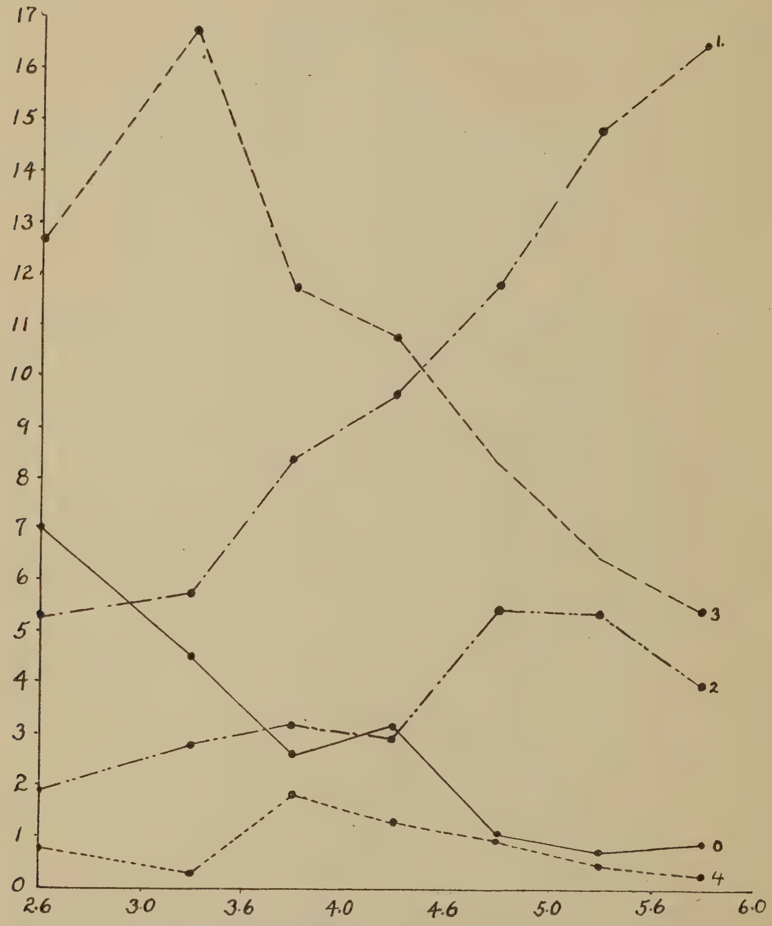


Figure 2. Types of Imaginative Response — Test A-B
(0) no response (1) reproduction (2) analogy (3) transformation (4) other types.
Average number of responses at seven age levels.

Chronological Age and Imagination

Chronological Age as related to the quality score of Test A gives a correlation of .365 ± .07, indicating a low but significant relationship between chronological age and imagination.

I.Q. AND IMAGINATION

Using I.Q. as a measure of "brightness" the correlations were as follows:

r between I. Q. and Test A	.15 ± .07
r between I. Q. and Test B	.02 ± .08

Both of these being so low as to be insignificant indicates that intelligence and fantastic imagination are unrelated.

CHAPTER IV

TEST C

Material

The stimulus cards used for Test C were selected from those used in Tests A and B. These are reproduced on Page 15. Selection was made on a frequency basis, preference being given to those items in Tests A and B which had brought most new responses. This method of selection eliminated all the items which were whole objects, since these, for the most part, brought simple reproductions. Four of these items were retained for the preliminary pictures used for training the child in the procedure. As the subject could reproduce these easily they served to indicate whether or not the child understood the instructions, and whether the illumination and time of exposure were sufficient for him to recognize the known object. A short practice period with these four preliminary pictures was sufficient to give him an understanding of the procedure.

As a result of this method of selection Test C consists of fourteen items from Test A and fourteen from Test B. The equal number from each test is purely the result of chance.

The method of administering this test was the same as that used for Test A and B as described on page 22 under Procedure.

Subjects

The subjects were the one hundred and two children of the Preschools of the Child Welfare Research Station of the State University of Iowa as described on page 20.

Method of Scoring

Test C was scored by the quality score and also by the frequency score. These scores are explained in detail in the chapter on scoring method, page 17.

Reliability of Test C

The frequency scores of Test A-B correlated with the scores for the corresponding seventy-one subjects in Test C gives r as .886 ± .017.

Correlation of alternate items in Test C as scored by the quality score gives r as .709 which corrected by the Spearman prophecy formula is .82 ± .02.

Correlation of alternate items in Test C as scored by the frequency score gives r when corrected as .77 ± .03.

Correlation of the average number of responses of each of the five types at each of seven age levels in Test A with the same data from Test C gives an r of .90 ± .025.

This last correlation is deserving of attention as it indicates the high relationship that holds between the chronological age and the type of response.

Types of Imaginative Response

TABLE 2

Average Number of Responses of Each Type at Seven Age Levels, Test C

	(0)	(1)	(2)	(3)	(4)
2:0-3:0	7.6	3.9	1.6	14.8	.8
3:0-3:6	6.8	4.1	1.4	16.	1.1
3:6-4:0	4.7	6.8	1.6	16.	1.3
4:0-4:6	3.4	6.8	1.6	16.6	1.4
4:6-5:0	1.7	12.3	3.9	11.7	1.
5:0-5:6	1.6	14.	2.7	10.	.4
5:6-6:0	2.1	14.4	1.6	10.7	.1

The results as shown in Table 2 and represented graphically on page 30, when compared with the corresponding Table 1 and Figure 2, page 26, show a striking simliarity. Reproduction as shown in Test C does not begin at so high a point as in Test A-B. This is due to the selection of items for Test C by which we eliminated those items which invariably brought reproduction, thus lowering the score for reproduction for all subjects. The decline in "don't know" responses is quite regular until the five year (Junior Primary) group is reached when it again increases. In contrast with Test A-B the plateau about the age of four years occurs in reproduction instead of "I don't know" responses and is compensated for by an increase in "analogy" and "transformation." This again is due to the increase in difficulty of reproduction in Test C. The regression in "analogy" from five to six years of age is strikingly similar in both tests. Again in Test C transformation rises slowly and for a longer period than in A-B so that the peak at the four year level is slightly higher than that for three years and a half.

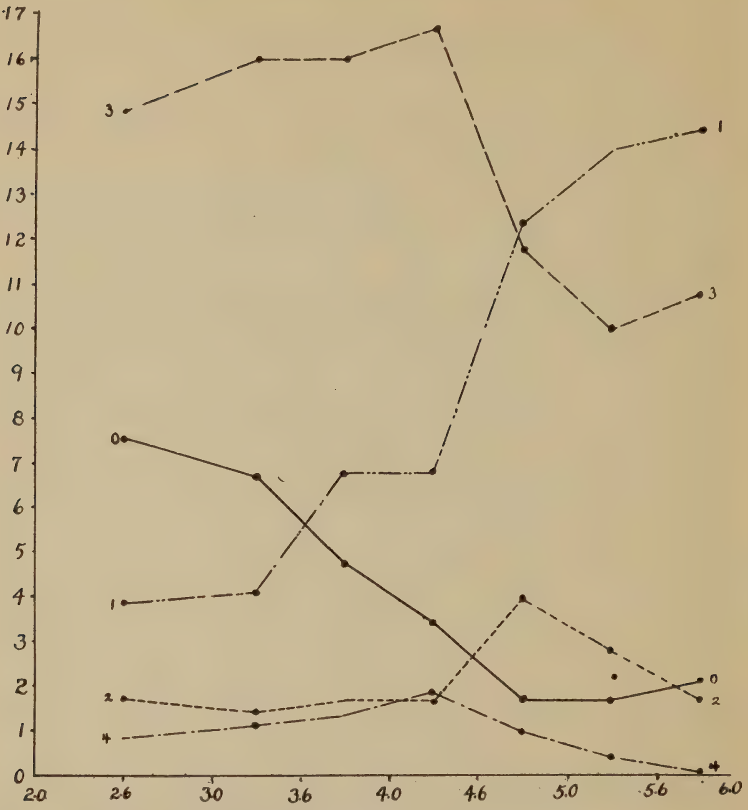


Figure 3. Types of Imaginative Response — Test C at seven age levels. (0) no response (1) reproduction (2) analogy (3) transformation (4) other types.

On page 31 are shown the corresponding results for the Test C frequency score. Here we find that as the use of terms used ten or more times (1) increases, the use of new terms (5) decreases up to the five year level when both new terms and frequently used terms increase. Just previous to this there has been a rapid increase in "don't know" responses followed by a similar decrease. The lines (2), (3), and (4) showing a progressive decrease in frequency gradually assume a form similar to the (5) group. There is a striking similarity between the line representing those responses occurring ten or more times (1) and the line in Figure 3 (1) representing reproduction in the quality scores.

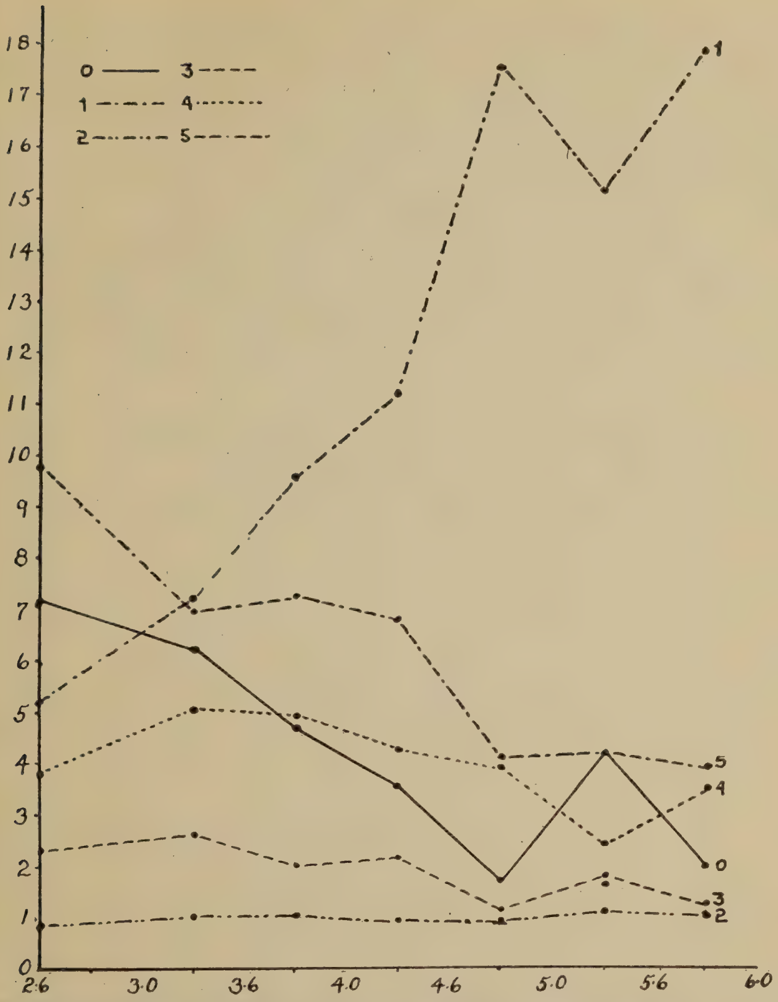


Figure 4. Frequency Scores at seven age levels. (0) no response (1) response used more than ten times (2) response used 8-10 times (3)) response used 5-7 times (4) response used 2-4 times (5) response used once only.

Intelligence and Imagination

r between I. Q. and Test C	.029 ± .06
r between M. A. and Test C	—.069 ± .06

Such low and insignificant correlations would seem to indicate that the fantastic imagery of the young child is unrelated to intelligence as measured by mental age or to "brightness" as measured by intelligence quotient.

Chronological Age and Imagination

The correlation between C.A. and imagination as measured by Test C frequency score is —.31 ± .06. This is a low but somewhat significant minus correlation which indicates some decrease in fantastic imagination with increasing chronological age.

Sex Differences

For the purpose of studying sex differences, forty boys were paired with forty girls as to chronological age. The average differences in ages between the members of pairs was 8.7 days. Averages of the quality scores for the forty pairs studied are shown in Table 3.

TABLE 3

Averages of Quality Scores of Forty Boys and Forty Girls paired as to Chronological Age

Sex	No.	Age	Ave. Score	S.D.	P.E.av.	Diff.	$P.E._{Diff.}$	$\frac{D}{P.E._{Diff.}}$
B	5		59	5.96	1.80			1.39
		2-3				5.00	3.58	(83 in 100)
G	5		64	10.28	3.10			
B	14		61.3	14.24	2.57			2.28
		3-4				8.91	3.91	(94 in 100)
G	14		70.21	16.40	2.95			
B	11		67.45	11.36	2.31			2.07
		4-5				5.45	2.64	(92 in 100)
G	11		62	8.00	1.63			
B	10		52	7.36	1.57			.94
		5-6				2.50	2.64	(74 in 100)
G	10		54.5	10.00	2.13			

These results are shown graphically in Figure 5, and would indicate that the girls reach the high point in their imagination one year earlier than the boys, that the point reached by the girls is somewhat higher than for the boys, and that the boys drop off more rapidly than the girls after they reach their highest point.

The number of pairs studied for any one age level is too small to establish norms or to draw final conclusions, but some interesting tendencies may be noted. If the number of subjects were sufficiently large, the P.E. of the difference is such as would indicate that in 83 cases out of a hundred the girls would exceed the boys in imagination at the two year level. In ninety-four cases out of one hundred the girls would excel at the three year level, while the boys would exceed the girls at the four year level in ninety-two cases in one hundred, while at five years the girls would again excel in seventy-four cases out of one hundred. Since our number of subjects for each age level ranges only from five to fourteen pairs, no reliability for these figures can be assumed although they may indicate a tendency, the reliability of which can only be determined by an extended investigation with large numbers of children.

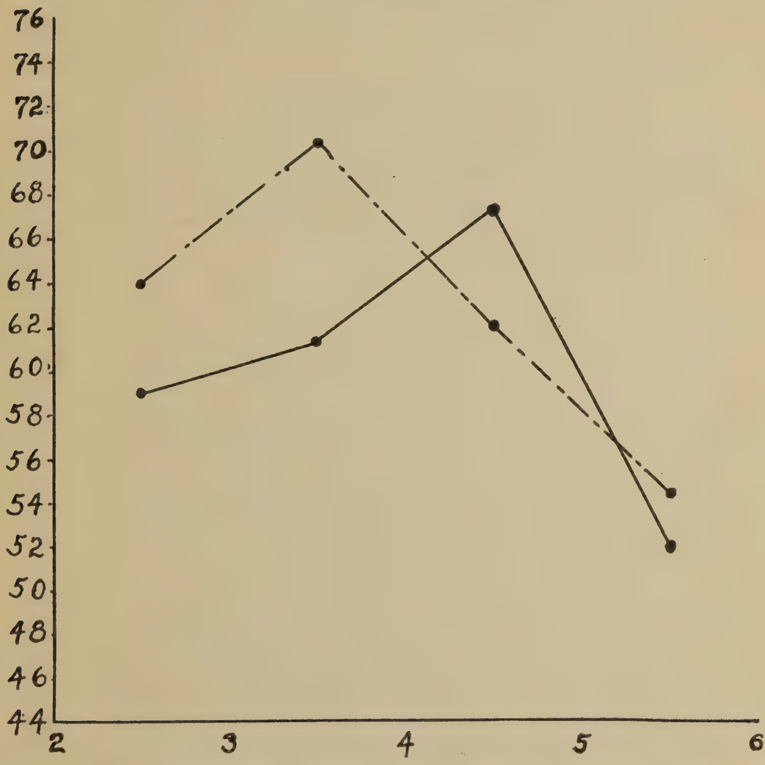


Figure 5. Sex Differences. Average quality scores at four age levels. Boys ———— Girls —.—.—.

The average score for the forty boys is 60.5, while that for the girls is 63.25, a difference of 2.75 in favor of the girls. The P.E. of the difference is 3.15, which indicates that in 72 cases in 100 the girls excel in imaginative scores.

The probabilities here used are taken from the table for finding reliability of a difference in terms of Probable error as given by Garrett.[1]

The range of scores for the forty boys is 27-93, while that for the girls is 32-116. The coefficient of variation as determined by the formula given by Pearson would indicate that at the two year level the boys are 63% as variable as girls, at the three year level the boys are 99% as variable as the girls, at the four year level the girls are 77% as variable as the boys, and at the five year level the boys are 77% as variable as the girls. For the total group the boys are 83% as variable as the girls.

TEACHERS' JUDGMENTS

In order to compare the results of Test C with teachers' judgments, it has been necessary to divide the subjects according to preschool groups, and to select only those children who have been under observation by all the teachers judging the group.

SUBJECTS

The subjects used in this study are as follows:

Group	No.	Age Range	Av. Age	I.Q. Range	Av. I.Q.
Home Lab.	12	2.3-3.4	3-2	87-129	109.7
Group I	17	2.9-5.5	3-6	60-154	105.5
Group II	16	3.11-5.3	4-7	62-148	110.5

In Group I all except one child fall between 95 and 154, and in Group II all but one child fall between 89 and 148. These two exceptions are twins.

JUDGES

The judges used for this study included the staff member in charge of the group in question and other members of the staff and graduate assistants working regularly with the group. There were three judges in Home Laboratory, five in Group I and three in Group II.

PROCEDURE

Each teacher was given a copy of the observational checking sheet (See observational method) containing instructions for observing imagination, in order that she might familiarize herself with the various types of imagination, to be considered in making her judgments. She was also supplied with a set of cards on which were typewritten the names of the subjects in her group, with instructions to arrange these names in a hierarchy beginning with the most imaginative and ending with the least imaginative, and then numbering the cards in rank order beginning with 1 as the highest in imagination.

---

[1] Garrett, Henry E., *Statistics in Psychology and Education,* Longmans, Green and Company, N. Y., 1926, p. 135.

TREATMENT OF DATA

These judgments were correlated both with the frequency score and with the quality scores of Test C. Since the number of subjects in each group is less than thirty the Spearman rank difference formula has been used.[2]

TABLE 4

Correlations of Teachers' Judgments With Imagination, I.Q. and C.A.

	Home Laboratory	Group I	Group II
Test C Frequency	.024 ± .20	.52 ± .12	.28 ± .14
Test C Quality	.075 ± .20	.59 ± .11	.39 ± .13
I.Q.	.33 ± .18	.55 ± .12	.38 ± .13
C.A.	.45 ± .16	—.20 ± .16	.30 ± .14

The discrepancies between the groups are very noticeable. In the Home Laboratory the relationship between test scores and teachers' judgments are practically zero, while in Group I the correlations are .52 ± .12 and .59 ± .11, which are quite significant. Group II falls between these two with a correlation of .28 ± .14 and .39 ± .13. There are two possible hypotheses for these differences. It may be that the judgment of the teacher is based on the ability of the child to speak fluently, and therefore in the Home Laboratory where the language of the younger child is not far developed his imagination does not attract attention as does that of the fluent speaker. If this is the case we should expect the judgments to correlate with chronological age, and this we find to be the case, r being .45 ± .16, positive but not very significant.

Another hypothesis is that the teacher may be judging "brightness" as imagination. The correlation found between Test C frequency score and I.Q. is .029 ± .067, practically a zero correlation, while Teachers' Judgments give correlations of .33 ± .18, .55 ± .12, and .38 ± .13, all positive correlations with I.Q. although not highly significant.

Perhaps a more significant indication of the variation of teachers' judgments is to be found in the deviation in the placing of the subjects in the best rank order. In the rank order of twelve subjects in Home Laboratory, we find S25 ranked 1 and 10; S2 ranked 3 and 11; S9 ranked 4 and 11. In Group I where correlations in general are higher, we find S7 ranked 2 and 13, S22 1 and 10, S49 2 and 12, S14 3 and 13. In Group II, S70 is ranked 3 and 10, S57 ranked 2 and 12, S73 ranked 7 and 16. Such wide deviations would indicate that teachers differ very greatly as to what constitutes imagination.

---

[2] Garrett, Henry E., *Statistics in Psychology and Education,* Longmans, Green & Co., New York, 1926, p. 195.

Since the frequency score is an objective measure of imagination, defined in this study as the production of something new, or of originality, as the seeing a similarity which escapes others, and since the quality score correlates .87 ± .016 with this frequency score and is based on the finer qualitative differences in types of imagination, it would appear that these measures, singly or combined, might serve as a criterion to determine the value of the Teachers' Judgment of imagination. In the Home Laboratory the Teachers' Judgments correlated with Test C frequency gives r as .024 ± .20; correlated with Test C quality, r equals .075 ± .20. In Group I Teachers' Judgments correlated with Test C frequency .52 ± .12, with Test C quality r equals .59 ± .11. In Group II Teachers' Judgment correlates with Test C frequency .28 ± .14, with Test C quality .39 ± .13. (Table 7.)

The higher correlations in Group I may be due to the fact that this is the age when imagination is at its height and is more noticeable; also the children have reached a more advanced stage in language development so that the imagination is expressed more freely in words and is therefore more readily recognized.

If, as is asserted in many studies, a larger number of judges gives more reliable results than a small number, then this also may be a factor in the judgments in Group I, since here there were five teachers with only three in each of the other groups. In any case, the correlations between Teachers' Judgments and imagination as measured by our tests are so low as to be insignificant in the Home Laboratory and Group II, while in Group I they are positive and significant.

Use of the Word "Like"

In his study of imagination by ink blots used in a series of tests of intelligence, E. A. Kirkpatrick[3] found that the younger children, Grades 1-3, were the more imaginative, that imagination decreased in the fourth, fifth, and sixth grades but increased again in the seventh and eighth grades. "These older children have learned that a picture may *resemble* something else," and indicate this by saying "it is like." In the present study we find that the children use the word "like" as early as two and a half years, its use increasing with chronological age. The greatest increase takes place in the fifth year. Forty-eight of the 102 subjects or 47% of the group used the word "like," the distribution being as follows:

---

[3] Kirkpatrick, E. A., "Individual Tests of School Children", *Psychological Review,* 1900, Vol. VII, pp. 274-280.

2 years	3 years	4 years	5 years
41%	41%	43%	53%

The average number of times the word is used by these forty-eight subjects is 2.98 each. The range of use is from one to eleven times. The child who used the word eleven times falling in the two year old group. The distribution of the number of times the word is used is as follows:

2 yrs.	3 yrs.	4 yrs.	5 yrs.
3.40	2.30	3.09	3.12

The differences at various age levels are not very significant, but if the one subject were eliminated who at the age of two years used the word "like" eleven times, we should have a slight but regular increase in the use of the word with increase in chronological age. This one subject, however, calls our attention once more to the importance of individual differences.

The results of this study on the use of the word "like" would scarcely agree with the results of Kirkpatrick, in which he would seem to restrict the use of the word "like" to the children of the upper grades. Nor does it seem to be a necessary correlate of imagination. The correlation with the quality score is approximately zero (.001). With mental age the correlation is low but positive, r equals .227 ± .06. When we use analogy in the somewhat broader sense in which it is used in the quality score, that is to include those items which name whole for part as well as those in which there is close resemblance, and also those where the word "like" is used, the correlation between analogy and M.A. rises to .28 ± .06, a low but positive and significant relation.

CONSTRUCTIVE AND NON-CONSTRUCTIVE RESPONSES

Cicely J. Parsons found in her study of imagination by means of ink blots that the non-constructive far exceed the constructive responses in children of seven and seven and a half years of age.[4] In the present study the responses have been classified in a similar manner as constructive and non-constructive. Examples of "constructive responses" from Parsons are, (a) a man knocked on his head by a rock, (b) a dog sitting on a mat, (c) a man with a big mouth and spikes coming out by his nose, (d) a little stick pointing to a man's head. The non-constructive she divides into four classes as follows: 1. Non-constructive without qualifications, *e.g.*, "box," "man"; 2. Non-constructive but qualified, *e.g.*, "a bad black eye"; 3. Non-constructive with action, *e.g.*, "the bird flying"; 4. Non-constructive with both qualification and action. For the purpose of simplification only two sub-divisions of non-constructive responses have been used here, that is, 1. non-constructive without qualification, and 2. non-constructive with qualification. The averages and the percentages of each type of response at various age levels are given in Table 8.

---

[4] Parsons, Cicely J., "Children's Interpretation of Ink Blots", *British Journal of Psychology,* 1917-18.

TABLE 5

Constructive and Non-Constructive Responses, Average Number and Percentage for Six Age Levels

Age	Non-con. Unqual.	%	Non-con. Qual.	%	Constr.	%
2:0-3:0	15.08	68	5.58	25	1.58	7
3:0-3:6	14.61	65	6.30	28	1.54	7
3:6-4:0	15.77	71	5.90	21	1.90	8
4:0-4:6	15.11	62	8.00	32	1.61	6
4:6-5:0	18.00	65	8.00	29	1.60	6
5:0-5:6	13.06	55	9.50	39	1.37	6
5:6-6:0	15.33	58	10.17	39	1.00	3

These results indicate a preponderance of non-constructive response at all of these ages, with an increase in the number of qualified responses with increasing chronological age and a decrease in the constructive responses from the third year on. The constructive responses are 6.14% of the total number of responses, qualified non-constructive responses are 30.28% and non-constructive are 63.57% of the total.

This is interesting in so far as it corroborates the findings of Parsons that non-constructive responses predominate. The nature of the test itself is such that a non-constructive response is generally sufficient to express the idea and would not test the ability of the child to make constructive responses. This is borne out by the responses of adults to similar stimuli. The writer in a seminar presented five of the pictures used in Test C and asked the students present to tell what their associations were. The responses given were not unlike those of the children and were all of the non-constructive type.

Interest in Animals

In the present investigation only one of the pictures used as a stimulus is suggestive of an animal. This one exception is No. 4, the tail of a cat. In the year from 2-3, 10 per cent of the responses were animals, and twelve different animals were named. In the year 3-4, 10 per cent of the responses were animals, and 24 different animals were named. At 4-5, 7 per cent of the responses were animals, with 13 varieties named, and at 5-6, 8 per cent were animals, with 24 varieties named.

Parsons in her study finds that "children are most interested in animals," and this study would corroborate that statement. While the child of three years gives a higher frequency of animal responses and names a greater variety than the child of four years, this is not necessarily interpreted as showing that he has any greater "interest" in animals. One interpretation of the results might be that because he is at the stage when imagination of the type of transformation is at its height, when his images are more vivid and when he is less able to distinguish his images from the objective facts, his images take the form of animals which no doubt form an important part in his dominant imagery. The older child may still retain his interest in animals, but having learned to distinguish between his own images and the objective facts, he now "reproduces" more frequently instead of "transforming" the stimulus.

Higher Types of Imagination

Correlations were made between the number of instances of "other types" of imagination such as construction, fanciful explanation, extension of language, appropriate quotations, and Mental Age. r equals .201 ± .06, a low but positive correlation. From a study of individual cases of those subjects who had the higher frequency of "other types" it would appear that many of these were "bright" as measured by I.Q., but on the other hand not all the "bright" children had creative imaginations. From this it would appear that creative imagination is a special ability, but one which requires as its basis a considerable degree of general intelligence. To make our point more clear we might say that to have the creative imagination of an Edison one must be intelligent, but not all intelligent people have the inventive ability of an Edison.

Multiple Responses

The number of subjects who gave more than one response to a single stimulus was 52, or 51 per cent of the group. Out of a possible total of 2856 responses, 121, or 4 per cent gave more than one item. The number and percentages of such multiple responses are as follows:

	2-3	3-4	4-5	5-6
Average number of multiple responses	1.16	1.53	1.11	.79
% of group giving multiple response	42%	62%	50%	43%

Although the percentage of multiple responses (4%) as compared with the total possible responses is very small, the distribution of these by age groups is of interest. Both in the average number of multiple responses and in the percentage of the group giving such responses the three year old group leads.

The small number of multiple responses may be due to the test situation where the child's answer is accepted as satisfactory and no attempt made to draw him out further. This condition would, however, appear to make such multiple responses as are given the more significant and reliable since they are entirely spontaneous.

Total Scores

The average total quality scores for age groups are as follows:

No.	12	13	21	18	10	16	12
Age	2-3	3:0-3:6	3:6-4:0	4:0-4:6	4:6-5:0	5:0-5:6	5:6-6:0
Score	56.6	62.3	63.71	65.55	59.2	49	50.83
Range	36-74	37-88	27-110	37-89	40-74	12-76	41-70

The differences in total scores from ages three to five are slight, but there is a decided drop at the five year level. As this coincides with the child's entrance to the more formal school situation in the Junior Primary, one may ask whether there is in this situation an inhibition or regression of imagination. In the scoring by types we found that at this time the child reverted somewhat again to the "don't know" type of response, while his score for reproduction took a corresponding fall. Is it possible that he is so instilled with the fear of making a mistake, from the adult standpoint, that he "plays safe" by saying he doesn't know?

This distribution of total scores would indicate that they are not as useful for interpretation of the differences in imagination at the various age levels as are the scores distributed as to types. The point of distinction seems to be the relative distribution of types rather than the total imaginative score, although this does serve to bring out the individual differences within the groups. For example in group 3:6-4:0 we have the child with the highest imaginative score, 110, and the child with the second lowest score, 27, giving us a range of 83 points between these individuals. This wide range of scores and much overlapping between the groups are evidence of the greater importance of individual differences than of group differences.

Imaginative Responses in Terms of Whole or Part

Two types of imaginative response named in the qualitative classification used in this study, analogy and transformation, preponderate during the years at which the fantastic imagery of the child is at its height. This gives opportunity for an objective study of the nature of the responses to the given stimuli. A study of the data shows that those parts of whole objects familiar to the children which were used as stimuli, were frequently responded to, not as familiar elements but as other wholes. The child is familiar, for example, with the features of the face, having been taught to point to and name the eyes, ears, mouth, or nose of his mother or other familiar persons. Yet, when these parts of a whole are separated from their usual background, they are often responded to in terms of the larger whole, as when he calls an eye "a face" or an ear "a shell."

In the type "analogy" have been included those responses which are closely similar to the stimulus, or where a part of the figure has been given and the child has filled out the figure to give a response in terms of the whole.

In the type called "transformation" we have a still greater change from the stimulus to the response. These responses are frequently in terms of other wholes of similar shape, as for example, when the picture of an eye is called a "cap" or a picture of a mouth is called an "aeroplane."

Lashley, in his experiments with vision in rats, finds a similar tendency to respond to the whole situation rather than to its elements:[5] "An animal trained to discriminate patterns of solid white on a black ground is undisturbed by reversal of the brightness relations, by substitutions of outlines for the solid figures, or even by partial outlines which retain some of the proportions of the original figures.

"In many cases it is clear that the equivalent stimuli involve none of the retinal elements which were activated during learning. Here we have a situation where a habit is formed by the activities of one set of receptors and executed immediately upon stimulation of an entirely different and unpracticed group. The equivalence of stimuli is not due to the excitation of common nervous elements. The equivalent patterns have in common only ratios of intensity or of proportion in the spacial distribution of excited points."

---

[5] Lashley, "Basic Neural Mechanisms in Behavior", Address of the President of the American Psychological Association at the Ninth International Congress of Psychology, New Haven, Conn., Sept. 4, 1929. *Psychological Review,* Vol. 37, No. 1, January, 1930.

In order that the frequency and distribution of such part and whole responses might be empirically determined nine of the stimulus pictures were selected as being parts of familiar whole objects. The items selected were as follows: No. 4 tail of a cat, No. 7 part of an arm, No. 11 an elipse, No. 12 an ear, No. 14 handle bar of a kiddie car, No. 15 a mouth with teeth prominent, No. 18 an eye, No. 22 a corner of a square, No. 23 a mouth.

In scoring the responses as whole or part no attempt was made to "psychologize" the response as to how it appeared to the child, but simply to make an objective scoring of the word used as to whether it was the whole of an original experience or whether he gave the response in terms of a new whole analyzed out from the greater whole. These new wholes fall in the classification under "parts" as all responses in terms of integrated wholes, however different they may be from the part given as a stimulus, fall under the classification "whole."

In order to determine the trustworthiness of the scoring of these responses, two members of the Department of Character Education were asked to score them. These results in a one to one correlation with the scores of the experimenter gave r as .91 ± .01, and .92 ± .01.

The responses of the one hundred and two subjects according to age levels are given in Table 9.

TABLE 6

Average Number of Responses in Terms of Wholes and Parts at Eight Age Levels, 102 Subjects

Age	Average No. Wholes	Average No. Parts
2:0-2:6	4.33	.0
2:6-3:0	5.33	.78
3:0-3:6	5.69	1.07
3:6-4:0	5.90	1.48
4:0-4:6	6.16	2.84
4:6-5:0	4.90	3.30
5:0-5:6	4.18	3.06
5:6-6:0	3.91	4.08

The results are shown graphically in Figure 6 and indicate that it is not until the child approaches the sixth year that the responses in terms of parts equal those in terms of wholes, despite the fact that the stimuli are all parts. The total responses for the preschool ages given to these nine stimuli were, in terms of parts 243, in terms of wholes 533. The resulting difference of 290 was in favor of wholes.

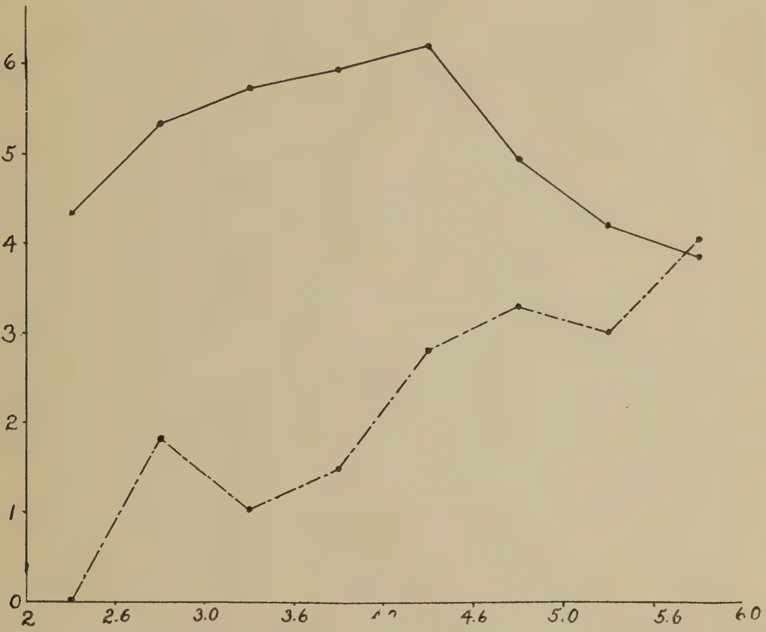


Figure 6. Average Number of Responses in Terms of Wholes or Parts at Age Levels Two to Six Years.
Wholes ————— Parts —.—.—.

These results seem to indicate a tendency for the child to respond first in terms of a larger whole or to transform the part into a different whole, and later in its development to select out elements from the greater whole which thereby become new wholes.

It may be contended that the response in terms of wholes is a matter of language acquisition. One criticism of such an interpretation is that the words used in the responses are often apparently less familiar words than the names of the parts to which the child responds. Such words as ear, arm, nose, or mouth are used frequently by the young child. The organismic theory would interpret the responses in terms of wholes as the reaching out of the total integrated organism toward the freedom of the whole, rather than restricting itself to the limitations of a single element. Biologically the data may be interpreted as the response to the whole being more significant to the life of the organism. It may be simply that the imagination is playful and dynamic and finds an outlet for its creative tendencies by the production of new wholes, or it may be interpreted as giving support to the "pattern" or "configurational" psychology.

Whatever the interpretation given, the data of this study would indicate that during these preschool years there are many more responses in terms of wholes than in terms of parts to pictures of parts of familiar wholes when separated from their usual background. What seems to be taking place in the learning process is an increase in the ability to select new wholes and to abstract them from the larger whole of the child's earlier experience.

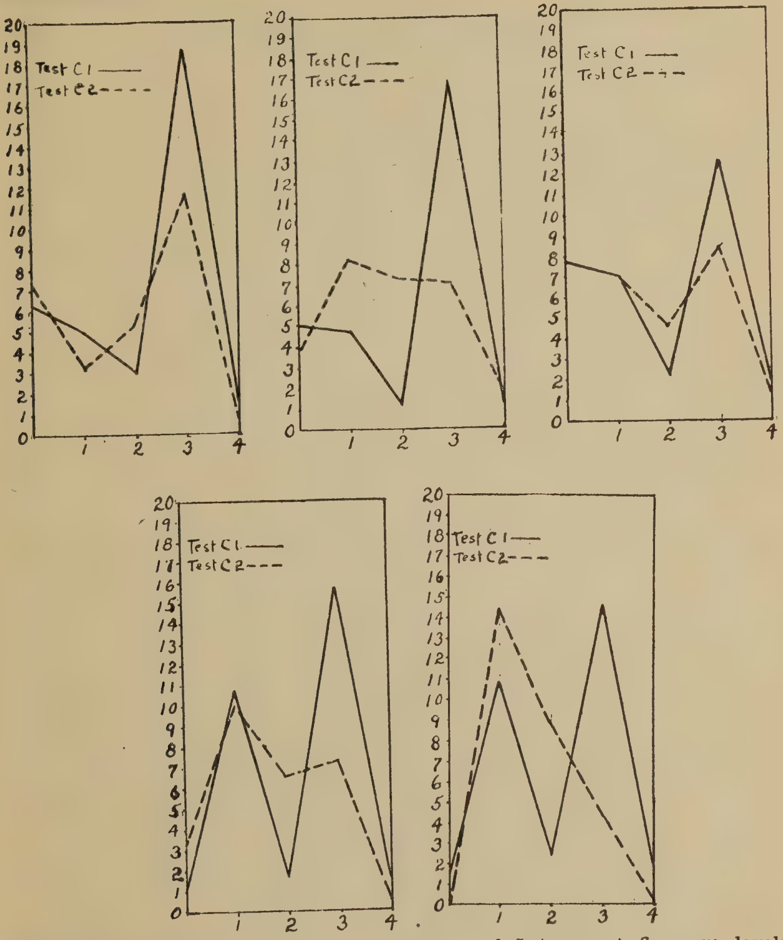
The generalization which precedes analysis into parts is not a new concept in psychology, but little scientific investigation has been done to determine the genetic development of this phase of the mental imagery of the child. The data given here are fragmentary and suggestive only. The writer includes them because they seem important as objective evidence of the precedence which the whole takes in the development of the imagination of the child, and which may on further investigation offer a partial interpretation of the fantastic imagery of the young child.

TEST C REPEATED

Ten months after the giving of Test C an attempt was made to repeat this test with the same children in order to ascertain whether the results found at certain age levels, were the same as would be secured by measuring the same children one year later. As it was not feasible for the experimenter to be in Iowa at this time, it was arranged, through the courtesy of the Child Welfare Research Station, to have a group of Graduate students, who were taking a course in experimental methods, carry on this test.

Unfortunately there were but eighteen of the original one hundred and two children who were available for the repetition of the test. Even with so small a number the results are worthy of record.

The tests were given at an average of ten months following Test C1. Table 10 gives the average number of responses for each type of imagination: (0) no response, (1) reproduction, (2) analogy, (3) transformation, (4) other types, for the eighteen subjects of this test in Test C and again for the same subjects ten months later in Test C repeated. In the Figures 7, 8, 9, 10, and 11 the solid line represents the first test and the dotted line the test repeated. In both the table and the figures the ages given are the ages at the time of the second test, the first test being given as stated above approximately ten months earlier.



Figures 7-11. Average Number of Responses of 5 types at five age levels and ten months later.
Figure 7. Age at 2nd. Test 3.6 — 4.0 and ten months earlier.
Figure 8. Age at 2nd. Test 4.0 — 4.6 and ten months earlier.
Figure 9. Age at 2nd. Test 4.6 — 5.0 and ten months earlier.
Figure 10. Age at 2nd. Test 5.0 — 5.6 and ten months earlier.
Figure 11. Age at 2nd. Test 5.6 — 6.0 and ten months earlier.

A study of these figures shows a decrease in "don't know" responses, an increase in reproduction, an increase in analogy, and a decrease in transformation. These results follow very closely the same changes with increase in chronological age as was found with the children of successive years in Test C. This may be seen by comparing the position of the varying types of imagination in Test C for one age level with those of the succeeding year level. The same comparison may be made with the successive levels in these five figures (7, 8, 9, 10, and 11) as indicated by the changes in the solid lines from one age group to the next.

TABLE 7

Average Number of Responses of Each Type in Test C and Test C Repeated After 10 Months

Age at 2nd Test	(0)		(1)		(2)		(3)		(4)	
	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
3:6-4:0	6.3	7.3	5.0	3.3	.3	5.3	18.7	11.7	1.7	1.
4:0-4:6	5.0	4.0	4.8	8.2	1.2	7.2	16.8	7.0	1.2	1.6
4:6-5:0	7.7	7.7	7.0	7.0	2.3	4.7	12.7	8.3	1.3	1.3
5:0-5:6	1.2	3.2	10.6	10.2	1.6	6.8	15.8	7.4	1.6	.8
5:6-6:0	1.5	.0	11.0	14.5	2.5	9.0	14.5	4.5	2.0	.0

r between the average number of responses at each age level in Test C1 and the corresponding age level in Test C2 equals .697 .069.

It would appear then, that, with due allowance for discrepancies due to the small number of subjects on which the averages are based, the development of imagination, as determined by the study of groups of children at successive age levels, is approximately the same as is secured by a study of the same individuals at intervals of ten months. This would also appear to indicate that these tests by further refinement and by securing norms for a larger number of subjects might be useful for determining an "imaginative age" as indicated by the relative distribution of the four types of imaginative response. While not giving us the basis for the statistical reliability of the test, they do give corroborative evidence for the reliability as determined on the basis of the distribution of types as given in Test A-B and Test C, pages 27 and 31.

CHAPTER V

OBSERVATIONAL METHOD

One method which has been used more than any other in the study of the young child is that of observation, and it has many points to commend it. In the study of imagination, especially where it is to be used for its predictive value, it is a method which cannot well be neglected, for it is only under the varied stimuli arising in free play that we may hope to see imagination at its best.

Development of Checking Sheet

In an endeavor to take advantage of the spontaneous expression of imagination, and at the same time to have some standard of judgment upon which all observers could agree, a checking sheet was developed in the following manner: The experimenter made observations in the four preschools over a period of a month, taking note of any acts of imagination which came to her attention and being less concerned with the subject who performed it than with the act itself, and seeking to find as many different types as possible. The following excerpts from these notes are taken as examples:

Child in swing, *"See, I have a new car."*

Children having a number of small pumpkins. S. got them all and put them on the shelf around the sand box. When asked, "What are you going to do with them?" he said, *"Sell them."* He then took a cup of sand and said, *"Look, I have some money."*

S. sitting in the *dry* wading pool, kicking her feet and saying, *"Go away water, go away water."*

S. playing in sand box, hands cup to another child and says, *"Please, some more coffee."* Receiving it she poured the sand into her mouth, and then with sudden astonishment on her face, she began to spit it out.

S. got two cylindrical blocks and said, *"Hey, going to make a steam roller."* It rolled away from him into the dry wading pool and he said, *"Now it's a big steamboat."*

S. picking up some stones on the ground said, *"These are pretty, aren't they?"*

S. builds a *"hospital,"* well balanced, square tower in center with large wings, proportioned much like the University Hospital.

S. draws a man, much detail. Hair, eyes, mouth, nose, and ears all in correct places.

S. after drawing a house said, *"The man didn't like the house so he tore it all up,"* while he scribbled vigorously all over the drawing.

S. with plasticine, *"I'm making my supper. Have pie for supper. This is meat,"* cutting piece of plasticine and placing it in the pan. When the teacher asked him to do something he said, *"I can't. I have to eat my supper."*

S. when block is taken from track on which he is pushing train said, *"It can jump right over."*

S. makes sound like train, *"choo-choo, choo-choo"* as he starts to move the train.

S. on tricycle to experimenter, *"Don't you want me to take you up town in my car?"*

S. shows great enjoyment of music by her facial expression. When given a drum she beats it in perfect time to the music being played on the piano.

S. digs hole in sand and putting in some pieces of coal says, *"Put some birdies in, they won't die. Let's make them a little house. Aren't they nice little birdies? No they aren't naughty."*

S. playing with stones sorted them in three ways, first, the prettiest color, then the most symmetrical in shape, and finally selected the smaller as prettier than the larger ones.

S. crawling on the floor picking up scraps of paper said, *"I'm crawling under the table like a worm."*

S. drew a train on one side of the paper. When he reached the edge of the paper, he turned it over, finished the train on the other side and said, *"The train went round a curve."*

S. sees child making cake at sand pile. Goes over and makes one just like it.

S. makes *"tadpole"* with plasticine. Another S. beside him immediately makes *"tadpole"* too.

S. paints a picture of moon with clouds around it. Puts in eyes, nose, and mouth. Suddenly and with apparent joy of discovery she put a stem on top of the moon and said, *"Now it's a jack-o-lantern."*

S. reciting a poem about *"A baker has come to town"*; when another child approaches she says, *"And here he is."*

S. tips over in wagon on soft ground. He screams, yells, and kicks as if he were very much hurt, but when the teachers said, *"Bobby, you take the wagon,"* S. jumped up and grabbed the wagon without a trace of hurt or tears.

S. to experimenter when she approached playhouse, *"You'll have to stay out of here, cause we are having a meeting."*

S. seeing clock said, *"Hickory, dickory dock, the mouse ran up the clock."*

S. with doll, *"Here's my bubby crying,"* and shaking it she said, *"cry baby."*

S. sends out the other children to collect all the kiddie cars and bring them to him. He puts them in the *"garage"* and takes complete charge. The other children do whatever he tells them, even some of them who do not want to give up their kiddie cars.

S. works constantly at construction with blocks; has a definite plan and gets others to help him carry it out; other children like to play with him and do what he suggests; does everything very systematically; never moves a block or lets another child move one without getting a truck and backing it into position. If truck tips over he rushes off for another truck and pulls the first one out.

S. playing house. *"I am the mother and you are the father and this* (the doll) *is the little brother. The brother died."* Takes doll and lays it in the cradle. *"The brother was only a little baby."*

From these and other instances were selected as many types of imagination as we could define and identify. From this list the checking sheet was arranged with the following instructions to observers.

INSTRUCTIONS FOR OBSERVERS

For each act of imagination observed, place a check mark in the appropriate column opposite the child's name.

If it is particularly striking, use a key number and make a note of the incident, giving the child's name and the number of the column in which it is checked.

If the imaginative act seems to fit in more than one column, check it in the one farthest to the right in which it might be classified.

(The numbers preceding the following items correspond with the numbers of the columns in the scoring sheet and are explanatory of them.)

I. If the child shows no imaginative response during the period of observation place a check mark in the column "No imaginative play". This will probably rarely if ever occur as nearly all play is at least imitative.

II. "Imitation." Doing as others do either in construction, manipulation or actions.

III. "Experimentation" is a trial and error process where the child tries to place his toys, himself or another person in some new relationship to see how they will behave.

IV. "Transformation" is changing one object into another by an act of the imagination, e.g. blocks to train, sand to coffee.

V. In "Animism" transformation takes the form of giving life to inanimate objects. The cloth dog is living.

In "Personification" the object or animal becomes a human being.

VI. "Acts of Sympathy"—self-explanatory.

VII. "Dramatization" where the child transforms himself into the character or object which his imagination represents.

VIII. "Imaginary Playmates"—self-explanatory.

IX. "Fanciful explanation" or what might be called "imagined reasons" such as "I can't fall down because I have on my new shoes", or "The man isn't in the plane, he must have gone down in a parachute."

X. "Fantastic Stories" or Romances are free associations of images.

XI. "New Uses for Toys"—self-explanatory.

XII. "Constructions"—self-explanatory.

XIII. "New Games"—self-explanatory.

In these three distinguish between construction which is imitative and construction which is inventive. This does not mean that the thing has never been done before, but that the child thinks of it himself and produces it as new to him.

XIV. "Extension of language" refers to the invention of new words or finding new uses for old words.

XV. "Appropriate quotations" where the child fits the quotation to the situation, e.g., he sees a moon and says "Hey diddle diddle, the cat and the fiddle, the cow jumped over the moon."

XVI. "Leadership with plan" is where the child dominates a situation, plans the game, directs the activities of others and shows that he has in imagination some end in view.

XVII. "Aesthetic appreciation" where the child by word or act shows that he appreciates aesthetic values.

This sheet was placed in the hands of six observers, graduate students who were being trained in a class in observation of preschool children. These six observers together with the experimenter then observed, each independently, the same child for one hour, checking every instance of imagination as they interpreted it according to the definitions given. The number of instances of imaginative play for the hour ranged from seventeen to twenty-four, while five of the observers fell within the range of twenty to twenty-two.

The question may arise as to what constitutes an "instance," *e.g.*, with respect to dramatization. In this study we have considered an instance as a whole situation. For example, in the case of a boy transforming himself into an engine, the whole situation "boy as engine" is a case of dramatization and not any one movement or sound. In the case of the subject who expressed her aesthetic appreciation in the selection of stones we have considered one "instance" when she selected and arranged the stones according to color, another instance when she selected and arranged them according to shape, etc. The fact that five of the seven observers fell within the range of twenty to twenty-two instances in observation of one child for one hour indicates that the problem of interpreting what constitutes an "instance" did not appear to be a very serious one.

As a check on the reliability of these results another child was taken as subject and observed in the same manner for one hour. In this instance there were seven observers besides the experimenter. Tables 11-14 give the results.

It should be kept in mind that these correlations represent the reliability of the checking sheet for the time covered by the observation and does not purport to give a total picture of the child's imagination.

TABLE 8

Checking of Imaginative Play According to Types of Imagination by Seven Observers

Ob.	III	IV	V	VI	VII	IX	XI	XII	XIII	XVI
A	2	3				5		7		
B	1	4			1	6	3	5	1	
C	2	3	1	1		5	2	7		1
D		3	1	1		6	1	7		1
E		5		1		6	1	5	2	1
F	1	4	1	1	1	6	2	7		1
Exper.	2	4				6	2	7		1
Av. of 7	1.14	3.71	.43	.57	.29	5.71	1.57	6.43	.43	.71

TABLE 9

Correlations Between Types of Imagination as Checked by Each Observer and Averages of Types as Checked by Seven Observers

r between	Obs.	A	and	Aver.	of	7	Obs.	.85 ± .05
r "	"	B	"	"	"	"	"	.76 ± .09
r "	"	C	"	"	"	"	"	.96 ± .017
r "	"	D	"	"	"	"	"	.81 ± .07
r "	"	E	"	"	"	"	"	.72 ± .10
r "	"	F	"	"	"	"	"	.88 ± .05
r "	Experim.		"	"	"	"	"	.96 ± .01

The period of one hour in a free play situation would be altogether too short and the situations therein too limited in number to give opportunity for expression of all the various types of imagination of which the subject is capable. The child may sit in the swing the greater part of the hour, or may play in the sandbox and show perhaps only one type of imagination. The longer the period over which the subject is observed and the greater the variety of situations the more closely would we approximate a measure of his imagination.

We have in this checking sheet, therefore, an apparently reliable instrument for the observation of imagination in a free play situation, but one which would require a great amount of time even for the study of individual cases.

In the observation of this second child (Table 13) the average number of items recognized by the observers was eleven, the range extending from five to nineteen. As was to be expected, individual differences in the quality of observation done appear, but in this case the range seems wider than in the case of the first child. The second child was of a quiet type and it seemed evident to the experimenter that the observers allowed their attention to wander and so missed some items. One factor which interfered with accurate observation was that the child expressed her aesthetic appreciation in words and it was impossible for so many observers to get near enough to hear her without distracting her attention. Therefore, while the observations of several observers were valuable in this study as a means of establishing the reliability of the checking method itself, it is quite certain that one, interested, trained observer would be able to get more satisfactory results when working alone.

TABLE 10

Checking of Imaginative Play of One Subject for One Hour According to Types, by Eight Observers

Obs.	II	III	IV	VII	IX	XI	XII	XIII	XVI	XVII
A	2	1						1		1
B		1	1		3					2
C		2		2	3					
D	3	2			1				1	3
E	4	2	1		3					1
F	2	3	2	1	5	1	1			1
G	5	4			2					5
Exper.	4	6	1	1	4					3
Av. of 8	2.5	2.51	.62	.5	2.51	.12	.12	.12	.12	2.0

TABLE 11

Correlations Between Types of Imagination as Checked by Each Observer and Averages of Eight Observers by Spearman Rank Difference Formula

r	between	Obs.	A	and	Aver.	of	8	Obs.	.48 ± .17
r	“	“	B	“	“	“	“	“	.77 ± .09
r	“	“	C	“	“	“	“	“	.69 ± .12
r	“	“	D	“	“	“	“	“	.70 ± .11
r	“	“	E	“	“	“	“	“	.93 ± .03
r	“	“	F	“	“	“	“	“	.88 ± .06
r	“	“	G	“	“	“	“	“	.82 ± .07
r	“	Experim.		“	“	“	“	“	.98 ± .009

INDIVIDUAL STUDIES

Individual observations of one hour for each child were made by the experimenter on twenty children. Profiles of these subjects are given on pages 54 and 55. While, as stated above, the period of one hour is too short to give an adequate picture of the imagination of the child, the results indicate the value of such a method for individual study over a longer period. Even with this short period of observation it becomes quite evident in comparing the profiles of the different age levels that the period from 3-6 to 4-2 stands out strikingly as having a much larger proportion of those items falling between items VI and XIII on our checking sheet. That is to say, the child at this age exhibits more dramatization, fanciful explanation, fantastic stories, new uses for toys, construction and planning of new games than does the child younger or older in the preschool group. This is in agreement with the results of the more statistical study made in the tachistoscopic test.

In the profile of S. 56 (age 4-2) there is an interesting combination of imaginative reasons and constructive ability. It would be a very profitable study to follow out the development of various combinations, such as occur in S. 56 or that of S. 27 who combines the telling of fantastic stories with evidences of artistic imagination, in order to determine whether these early trends are predictive of future abilities along similar lines.

RESULTS

I. It is possible to observe and classify the various types of imaginative response in a manner to secure high reliability, if the types are very clearly defined and the observers are sufficiently familiar with them to recognize them at once. As in any other scientific work it is a prime requisite that the observer be constantly on the alert and not

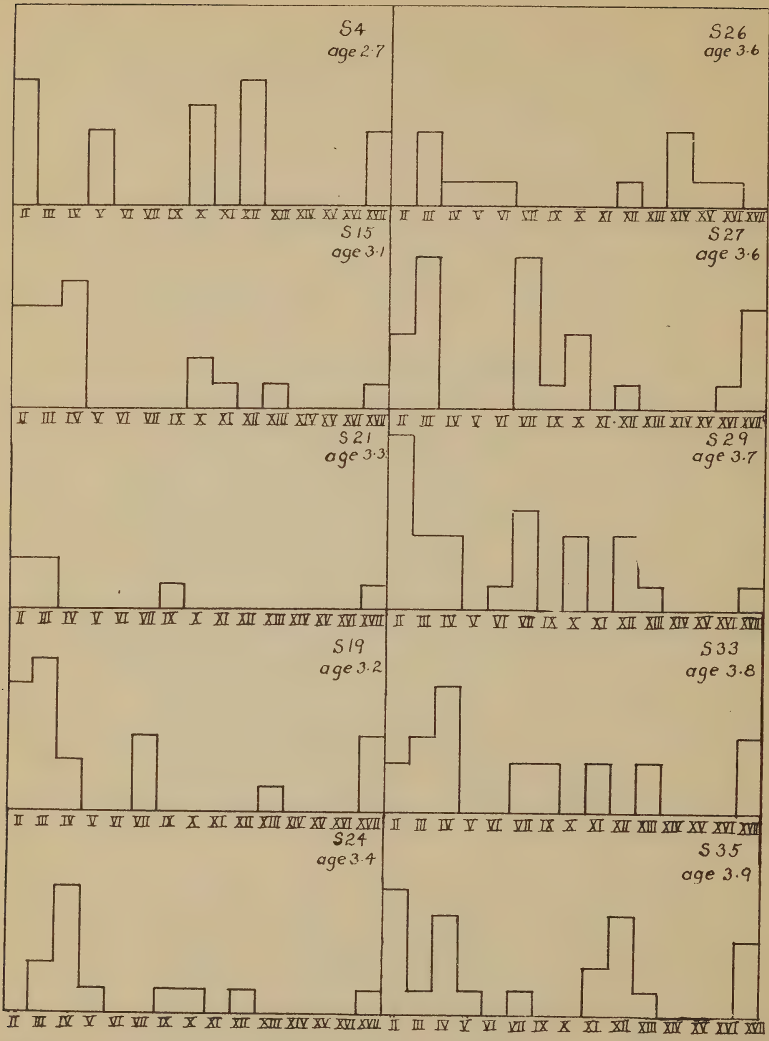


Figure 12. Profiles from Observational Study.
Roman numerals correspond with items on observational checking sheet, page 49.

allow his attention to be diverted even though the subject be temporarily inactive.

II. This method is particularly well adapted for the study of individual cases over a considerable period of time, so that a fairly com-

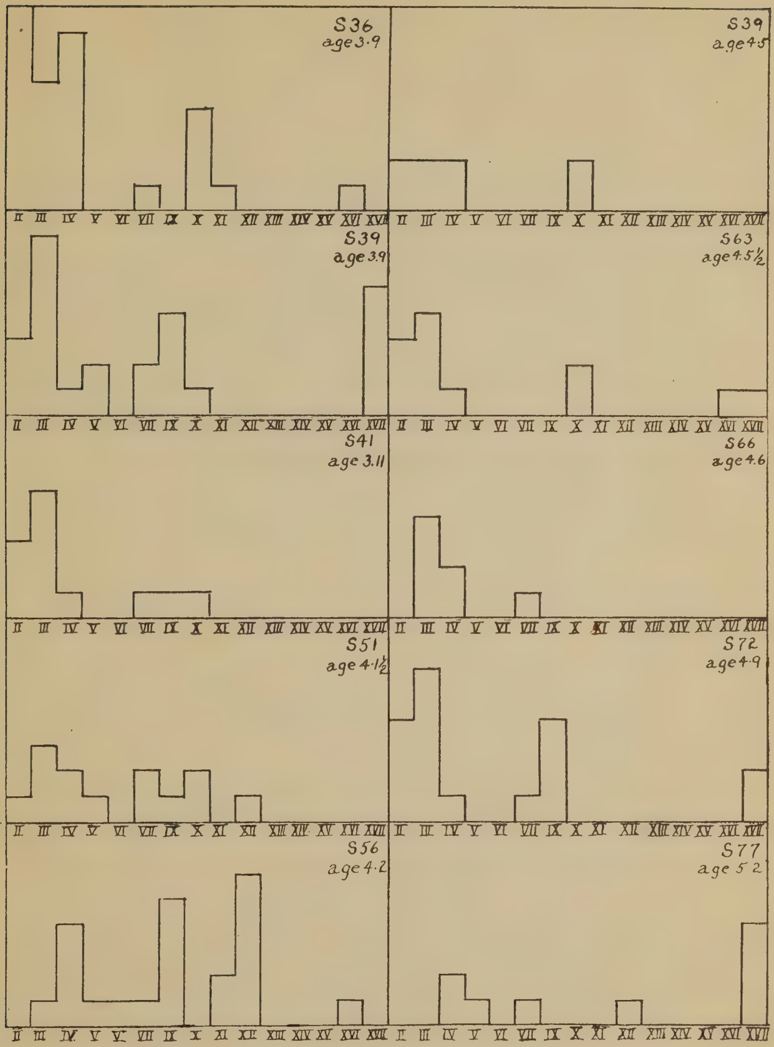


Figure 13. Profiles from Observational Study.
Roman numerals correspond with items on observational checking sheet, page 49.

plete picture of the various types of imagination and their comparative frequencies may be obtained.

III. In the brief observations here made, it is striking to observe the greater prevalence of dramatization, fanciful explanation, fantastic stories, new uses for toys, construction and planning of new games which occur between the ages of 3-6 and 4-2.

IV. Quite as important is the drop which takes place between 4:2 and 5:0. In this observational study it was impossible to include the children of the Junior Primary group as there was so little opportunity for free play, but the quality score in Test C, Tachistoscopic Test, indicates that the use of imagination rises again to some degree after the adjustment of the world of fancy to the world of fact.

Although these results are tentative so far as the development of imagination is concerned, it is felt that the high reliability of the checking sheet, as indicated by the high correlations between the ratings of several observers of the same child during the same period of time, justifies its inclusion in this study as a suggested method for further investigation of individual cases, and for the study of these cases over a period of years in order to determine its predictive value.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The summary and conclusions as stated in this chapter are to be understood as being applicable only to the subjects, tests, and conditions as described in this study. They do not purport to establish norms since the subjects are too few in number as well as being from a selected group. Further refinement of the tests and their application to a wide sampling of the population is necessary for validation of these findings.

Apparatus and Material

I. Whipple's Rotary Tachistoscope can be used in testing the preschool child under controlled laboratory conditions with satisfactory results.

II. Meaningful stimuli, such as pictures of whole or part objects, produce responses which can be classified under types of imaginative response.

III. The normal child of two years has reached a point in mental development when a substitute stimulus can bring recall of past experience.

IV. As development proceeds, a partial or slight stimulus will cause recall and may bring up more than one item of past experience.

V. The stimulus may bring a train of associated responses.

Scoring Methods

I. The frequency score, by virtue of the entirely objective method by which it is arrived at and the self-evident fact that it measures originality, may serve as a criterion for determining the validity of other measures of imagination.

II. The quality score, which is based on "types" of imagination and which gives us finer distinctions for our study, correlates with the frequency score .87 ± .016.

III. The quality score, as obtained by two independent scorers gives r as .84 ± .019.

IV. Reliability as measured by correlation of Test A-B with Test C frequency score equals .886 ± .017.

V. Alternate items of the frequency score in Test C give r as .77 ± .03.

VI. Since the responses according to distribution of types are more indicative of the child's stage of development than the total score and since the response of the imaginative child varies from item to item and from time to time, it would appear that the reliability of the test would depend more largely on the relative distribution according to types at different ages. Correlating the scores of five types at each of the seven age levels with the same data from Tests A-B, we find that r equals .90 ± .025. r between this data for Test A and Test B is .97 ± .004.

Types of Imaginative Response

I. "Don't know" responses decrease steadily with chronological age up to five years when, probably due to educational pressure, they increase somewhat.

II. Reproductive responses increase steadily with chronological age.

III. Transformation reaches its height between three and four years and from then on decreases at approximately the same rate as reproduction increases.

IV. Analogy reaches its height during the fourth year, which is followed by a decline in the fifth year.

V. The more creative types of imagination are at their height from ages 3:6 to 4:6 and reach their lowest ebb during the fifth year. These instances of higher types are furnished by forty of the one hundred and two subjects, while 10 per cent of these forty furnish 66 per cent of the instances of higher types of imagination.

VI. Total imaginative scores are highest at 4:0 to 4:6, but the average differences are very slight from three to five years. This period is followed by a sudden drop from an average score of 59.2 to 49 at the time when the child enters the Junior Primary from the preschool.

VII. The great overlapping in the range of scores for all age levels as well as the wide range at each level indicates that individual differences are more significant than group differences.

Intelligence and Imagination

Correlations between I.Q. and imagination, and M.A. and imagination are so low and insignificant as to indicate that very little relationship exists between intelligence and the fantastic imagination of the young child.

Chronological Age and Imagination

A somewhat significant minus correlation exists between chronological age and imagination (—.31 ± .06).

Sex Differences

I. Sex differences are slight, but insofar as they exist are in favor of the girls. The average score for girls is 63.25, for boys 60.5, a difference of 2.75 with a P.E. of the difference of .746.

II. Girls reach the height of imagination one year earlier than boys, excelling them at three years of age, while the boys excel at four years. The difference at three years is 8.91 in favor of the girls with a P.E. of the difference of 1.43. At four years the difference is 5.45 in favor of the boys with a P.E. of the difference of 1.05.

III. Boys reach their high point one year later than the girls and the scores fall off more rapidly so that at the six year level the girls are again slightly higher than the boys.

Teachers' Judgments

I. Teachers' judgments do not seem to serve as reliable criteria by which to measure imagination. Correlations with tests of imagination ranging from .024 to .59.

II. The average judgments of five teachers in Group I gave higher correlations than three teachers in the other groups, but this may be accounted for by the fact that Group I is the most imaginative age.

The Word "Like"

I. The word "like" is used by 47 per cent of the subjects, its highest frequency being in the two year old group.

II. Correlating the frequency of "like" with I.Q., imagination, and chronological age gives a zero correlation in each case. r between frequency of "like" with mental age is .227 ± .06.

Constructive and Non-constructive Responses

I. Non-constructive responses without qualification are much in the majority, 63.57 per cent of the total.

II. Qualified non-constructive responses occur in 30.28 per cent of the cases. These responses increase with chronological age.

III. Constructive responses occur in 6.14 per cent of the cases. They are at their height at ages 3:6 to 4:0, decrease slightly from 4:0 to 5:6 and make a very marked decline during the period 5:5 to 6:0.

Interest in Animals

I. The findings of Parsons that "children are most interested in animals" are confirmed in this study.

II. The high frequency of this type of response occurs at age 3-4 when "transformation" is at its height.

Multiple Responses

The children at the three year level give a higher average number of multiple responses and a larger percentage of the children at this age (62%) give responses of this type, but the total number of multiple responses is only 4 per cent of the total possible.

Individual Differences

I. A study of the total quality scores at various age levels shows a wide range of scores with much overlapping in the groups and indicates that for total imagination scores the individual differences are much greater than the group differences.

II. The study of sex differences shows a wide distribution of scores with much overlapping, showing here also that individual differences are more significant than group differences.

III. The individual case studies and the comparison of the profiles are also indicative of wide individual differences.

Imaginative Responses in Terms of Whole or Part

I. Children of preschool age respond to pictures of parts as if they were other wholes.

II. Response to parts as parts increases with chronological age, but it is not until the child approaches the sixth year that the number of such responses equals that of responses in terms of wholes.

III. For the entire preschool group, the responses to nine pictures of parts were: parts 243, wholes 533.

Test C Repeated

With allowance for discrepancies due to the small number of subjects in the second test, the changes indicated in Test C repeated after ten months are very similar to those shown by the succeeding age levels in Test C1. The correlation between the average number of responses at each age level in Test C repeated with the same data from Test C1 is .697 ± .069.

Observational Method

I. Because of the length of time required to obtain a full picture of the child in the free-play situation, the observational method is more applicable for individual case studies than for groups.

II. The observational checking sheet used in this study gives evidence of high reliability. Correlations between the observations of the experimenter and the averages of seven observers over a period of one hour, gives r as .96 ± .017. In a second one hour period of observation with eight observers and a different subject the r between the experimenter and averages of eight observers was .98 ± .009.

III. Profiles from individual case studies corroborate results from the tachistoscopic test as to the age of the highest point of imagination at age 3:6, and also the presence of the greatest degree of creative imagination in the year from 3:6 to 4:6.

Implications for Education

One of the most striking results in this study and one which confirms the findings of previous observers is the prevalence of the fantastic type of imagination in the third and fourth years. So general is this characteristic that from whatever point of view we have considered it, the height of this type appears at these years.

A careful study of the responses given by the child, as well as an observational study of his attitude and behavior would indicate that the child is responding in all seriousness and with full assurance that he is giving the correct answer. The image aroused by the stimulus would seem to be so vivid as to be taken for the object itself. It is at this age that parents and teachers should pause before condemning the fanciful stories as purposeful untruths, or by stern repression sealing up those avenues of expression through which creative imagination seeks an outlet. The ability of the child to see resemblances hidden to the unimaginative mind of the adult, who in turn may have been repressed by similar methods of education, is a gift, which if rightly directed may produce an artist or a scientist. In our desire for the inculcation of factual knowledge is there not a real danger that we may be suppressing that imagination which Leeming so aptly calls, "Mind's Dominant Power"?[1]

It is true that the child must learn to distinguish between fact and fancy, but may it not be possible for education to devise a method by which this learning may proceed without the sacrifice of imagination? Such a method would require the finding of legitimate channels in which imagination might move forward unfettered, such perhaps as art, music, literature, or even science itself, for what are our hypotheses but the work of an active imagination resting on a foundation of knowledge and experience? That teacher or parent who can "become as a little child" and with him enter into the world of his imagination, may by so doing, foster a creative genius, or at least make possible the "dreaming of dreams" and "seeing of visions" which in later years may prove an endless source of comfort and enjoyment. At the same time this "entering in" may be the means by which the child learns to differentiate between the world of fact and his "make-believe" world, without the necessity of resorting to harsher methods of repression. As E. D. Starbuck[2] has well said: "It is the imagination rather than ideation and reason that is the mechanism for the release of all values including the moral. . . . The imagination is the life of the mind. The ideas are 'dull and coarse of thumb'; the imagination is delicate and has wings like those of a fairy. Thoughts are descriptive; the imagination is creative. Through the symbolism it uses it emancipates the mind from the thraldom of things. Like magic it harvests meanings and values abstracted from sensory detail. It gives orientation, perspective, knowledge, wisdom. Feeling out kinships among the elements of experience is always a fanciful act and is the secret of insight and outlook."

---

[1] Leeming, B. C., *Imagination, Mind's Dominant Power.* M. H. Schroeder, 1926.

Another danger in our educational program lies in imposing on the child adult standards which are frequently not applicable in the child's stage of development. Much has been said in criticism of our standardized methods of education, and it should scarcely be necessary to emphasize this point in its relation to those realms where imagination should flourish, and yet it is in these very fields where this sin is most frequently committed. Harold Rugg, in an address in Iowa City on July 2, 1929, said, "We go into a school and see thirty children all copying one picture, even keeping the proportions as near to the same scale as possible. This is imitation or reproduction and gives opportunity for no creative art. It is little short of vicious. There is a fundamental dfference between the production of something original to the child and a representative or adaptive act. The only teacher who can sense this is one who is an artist."

While imagination exists in some degree in all normal chldren there are wide individual differences and many types of imagination. Is it not the function of education to discover the means of fostering these special abilities and providing opportunity for their fullest development? It would prove an interesting experiment to provide for S. 56, for example, the fullest opportunity to develop his apparent ability in construction and invention, and to follow his development during the next twenty years so as to determine whether the tendencies displayed at the age of four years may be predictive of success in similar lines. It is possible that vocational guidance should be begun in the nursery, not by forcing on the child a vocation selected by teacher or parent, but by allowing him to develop along the lines of his prevailing interests, with encouragement for his every creative act, whether or not it conforms to adult standards. As Harold Rugg said in the lecture quoted above, "Leave children alone until you find out what they have in them. Only a person who is a clairvoyant can read the mind and soul of a child enough to know what he wants to make. In so far as the production satisfies the inner desire of the child, it is creative. As one child said, 'It looks the way you feel inside.' This does not imply a method of hands off all the time, but keep your hands off in the beginning. Find out what he has lived. It is only out of his own experience that he can produce." Why should S. 56 spend all his time in school learning the three Rs, which with his I.Q. of 128 could be mastered in a much shorter time than that required by the average child, while his keen interest in construction is stifled or allowed to fade away from disuse? If the tendency is strong enough he may find opportunity to develop it to some extent, but with even partial repression he may attain only mediocrity and the world be deprived of a great engineer or skilled surgeon.

---

[2] Starbuck, E. D., and Others, *A Guide to Books for Character,* Vol. II, p. 14. Macmillan, N. Y., 1930.

While the results of our investigation indicate that not all children of high intelligence have at the same time a high degree of imagination, there are many instances of children with imagination of the creative type who have also high intelligence. It is where this combination exists that special studies should be made to determine whether we have here the material out of which our creative artists and scientists may be made, if it be not smothered by the zeal of those who would turn all fancy into fact and destroy at its conception that power of the mind which combines the items of experience and from the combinations thus formed brings forth those new ideas which alone make progress possible.

BIBLIOGRAPHY

(1) Bain, Read, "The Validity of Life Histories and Diaries", *Journal of Educational Psychology,* Vol. III, Nov. 1929.

(2) Binet and Henri, "La Psychologie Individuelle", *L'Anneè Psychologique,* Vol. II, 1895.

(3) Dearborn, G., "Blots of Ink in Experimental Psychology", *Psychological Review,* Vol. IV, 1897.

(4) Dearborn, G., "A Study of Imagination", *American Journal of Psychology,* Vol. IX, 1898.

(5) Garrett, Henry E., "Statistics in Psychology and Education", Longmans, Green and Company, N. Y., 1926.

(6) Hargreaves, H. L., "The Faculty of Imagination", *British Journal of Psychology,* Monograph Supplement, Vol. III, 1929.

(7) Kirkpatrick, E. A., "Iindividual Tests of School Children", *Psychological Review,* Vol. VII, 1900.

(8) Koehler, Wolfgang, "Gestalt Psychology", Horace Liveright, N. Y., 1929.

(9) Lashley, K. S., "Basic Neural Mechanisms in Behavior", Address of the President of the American Psychological Association at the Ninth International Congress of Psychology, New Haven, Connecticut, Sept. 4, 1929, *Psychological Review,* Vol. 37, No. 1, January 1930.

(10) Leeming, B. C., "Imagination, Mind's Dominant Power", M. H. Schroeder, 1926.

(11) Parsons, Cicely J., "Children's Interpretations of Ink Blots", *British Journal of Psychology,* Vol. 9, 1917-18.

(12) Piaget, Jean, "Judgment and Reasoning in the Child", Harcourt, Brace and Co., N. Y., 1928.

(13) Ransohoff, Martha Beckman, "Imagination in Young Children", Unpublished Thesis, University of Cincinnati, 1928.

(14) Ribot, Th., "Essay on the Creative Imagination", Open Court Publishing Co., Chicago, 1906. (Out of print)

(15) Rugg, Harold, "The Creative Art", Address delivered at the University of Iowa, July 2, 1929.

(16) Sharp, Stella Emily, "Individual Psychology", *American Journal of Psychology,* Vol. X, 1899.

(17) Spearman, C., "The Abilities of Man", Macmillan and Company, London, 1927.

(18) Starbuck, Edwin D., "A Guide to Books for Character", Vol. II, Fiction. Macmillan Company, N. Y., 1930.

(19) Wheeler, Raymond Holder, "The Science of Psychology", Thomas Y. Crowell Company, N. Y., 1929.

(20) Whipple, Guy Montrose, "Manual of Mental and Physical Tests", Warwick & York, Inc., Baltimore, 1910 and 1915.

IOWA STUDIES IN CHARACTER

Volume I

No. 1. World Citizenship *James C. Manry*

No. 2. The Measurement of Character and Environmental Factors Involved in Scholastic Success *Frank K. Shuttleworth*

No. 3. The Study of Religion in State Universities *Herbert Leon Searles*

No. 4. Untruthfulness in Children: Its Conditioning Factor and its Setting in Child Nature *W. E. Slaght*

Volume II

No. 1. Measuremnet of the Comprehension Difficulty of the Precepts and Parables of Jesus *Samuel P. Franklin*

No. 2. A Comparative Study of Those Who Accept as Against Those Who Reject Religious Authority *Thomas H. Howells*

No. 3. A Comparative Study of Those Who Report the Expenience of the Divine Presence and Those Who Do Not *Robert Daniel Sinclair*

No. 4. A Study of the Placement in the Curriculum of Selected Teachings of the Old Testament Prophets *Ralph Thomas Case*

Volume III

No. 1. The Attitudes of Children Toward Law *Earl G. Lockhart*

No. 2. Biblical Information in Relation to Character and Conduct *Pleasant Roscoe Hightower*

No. 3. The Character Value of the Old Testament Stories *George W. Beiswanger*

No. 4. The Development of Imagination in the Pre-School Child *Elizabeth Gordon Andrews*

Obtainable from the Department of Publications

University of Iowa, Iowa City, Iowa

Each number — $1.00

Annual subscription, $4.00 per volume

3 1197 00408 3074